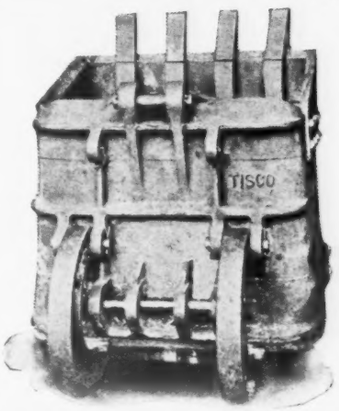
The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Chicago, August 9, 1924 FOUNDED 1902 Volume XXVII, No. 16

TAYLOR-WHARTON IRON & STEEL CO.

TIOGA STEEL & IRON CO. | WM WHARTON Jr. & CO. INC. | PHILADELPHIA ROLL & MACH'E



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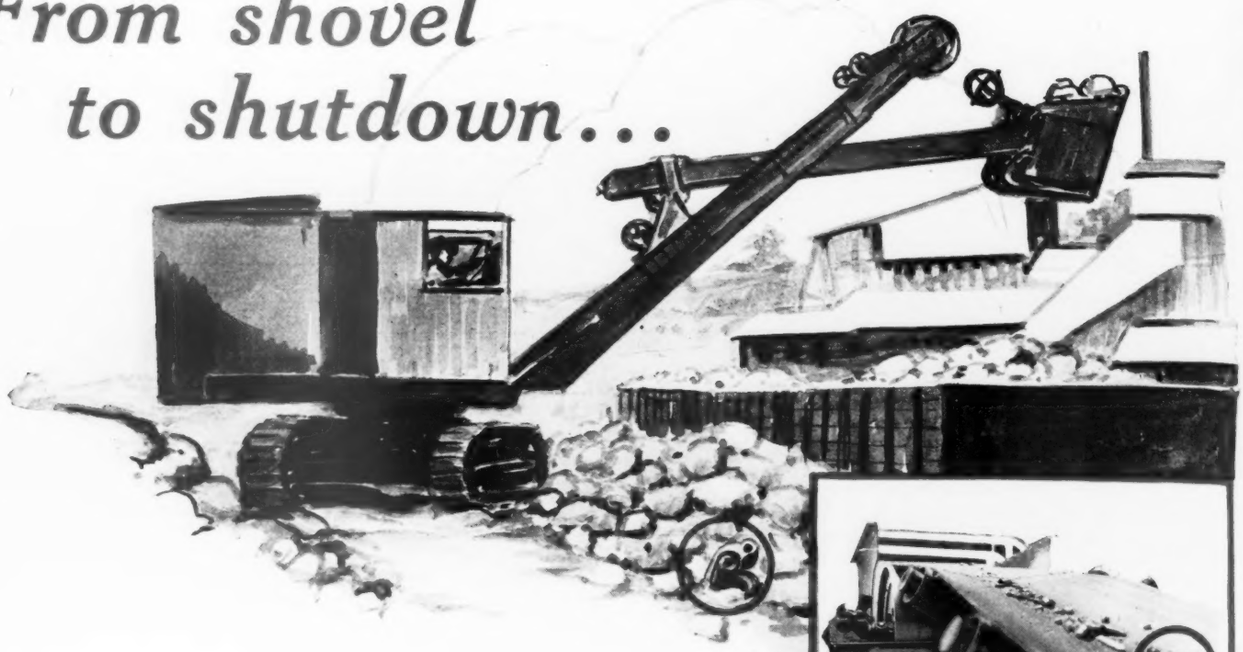
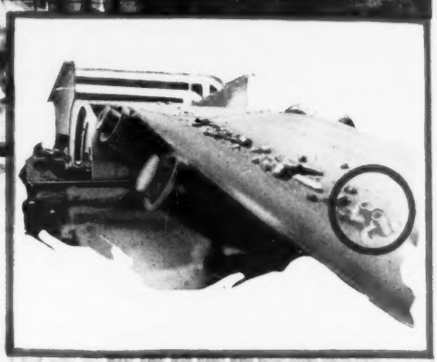
From shovel to shutdown...





IT'S funny how junk accumulates. Take any pit, quarry or operation involving the use of big machinery and note the pieces of metal lying around the place. Here's a drawbar, a coupling pin, maybe a piece of rail, or pick head.

At any minute the shovel may pick one up and send it on the road to your crusher. Once started will anything stop it or will it mean a wrecked crusher and shutdown?

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Rock Products

Volume XXVII | Chicago, August 9, 1924 | Number 16

Henry Ford's Cement Plant in Operation

Model 1000-Barrel-Per-Day Plant at River Rouge, Detroit, Michigan, Makes Portland Cement from Blast Furnace Slag by Wet Process

By George M. Earnshaw

Central Representative, Rock Products

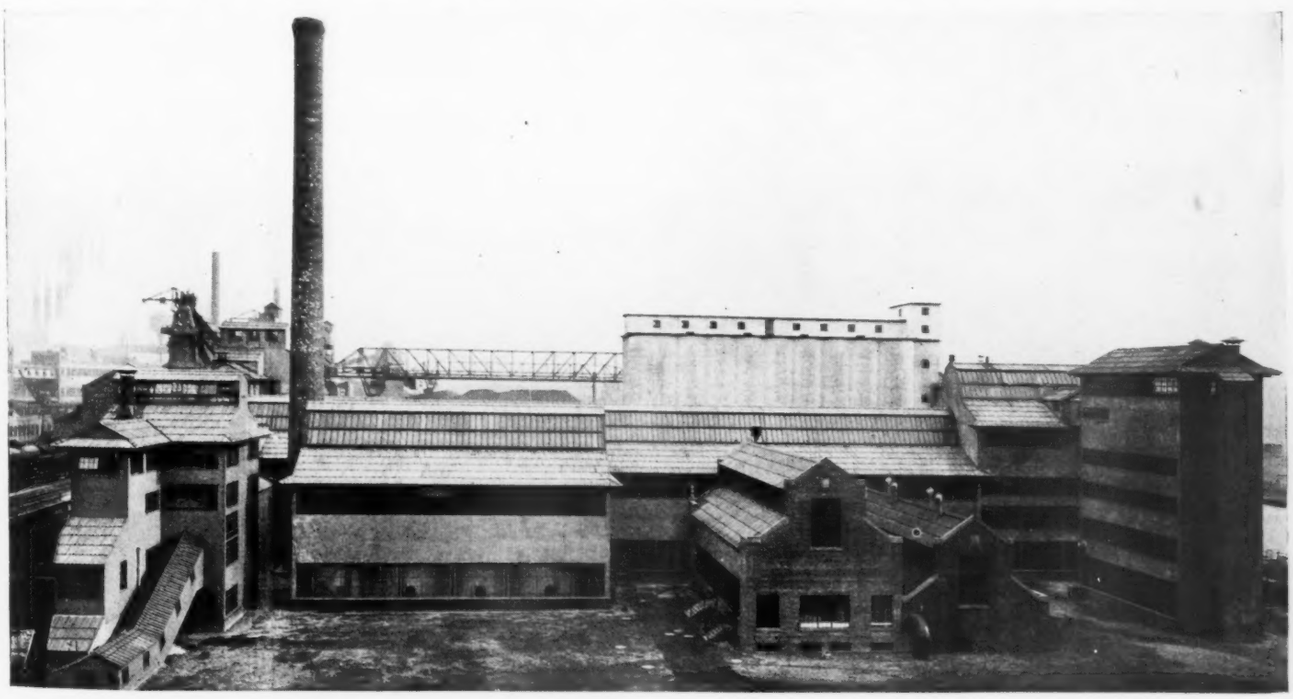
A CEMENT plant, which can truthfully be called a model, was recently completed and put into operation by the Ford Motor Co. at its River Rouge (Mich.) works. It is the completion of another step in the Ford development plan to meet, at least in part, every one of the company's requirements from its own resources. To Mr. Ford, it is simply the inauguration of another industrial economy.

Everything has been done to make the plant as fool-proof as possible. In fact, the writer was ever on the alert, while going through the plant with Superintendent Lockhart, to find some place, some piece of machinery that was unguarded, where there wasn't provided some sort of protection for human life. The conclusion he reached, at the end of his tour, was that about the only way a man could get hurt or killed would be to climb up on one of the buildings and wilfully fall off. There are railings and guards everywhere, and if one wants to see a machine he must first unfasten the sheet-steel door of its cage.

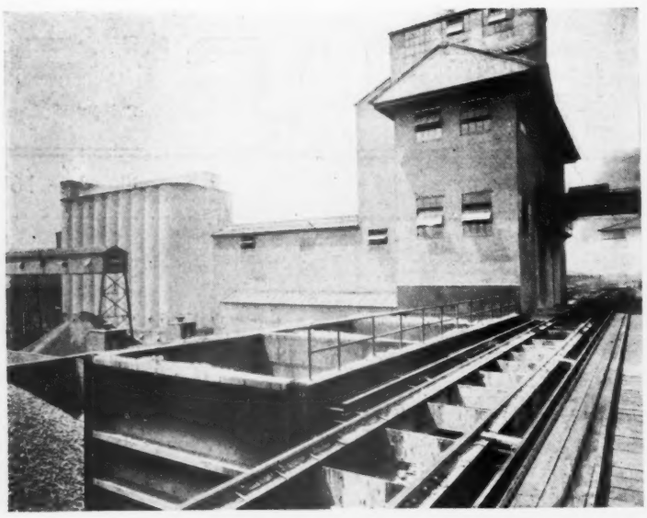
Next after safety comes cleanliness. No expense is spared in keeping the entire plant *absolutely* clean. In addition to painters, the Ford plant provides employment for 33 men who do nothing but sweep, wash windows and dust. And speaking of paint: *Everything* is painted, and in colors that are serviceable and pleasing to the eye. In this respect it was especially startling to the writer ot note that the kiln and cooler had been covered with alumnimum paint, giving them the appearance of almost snow whiteness.

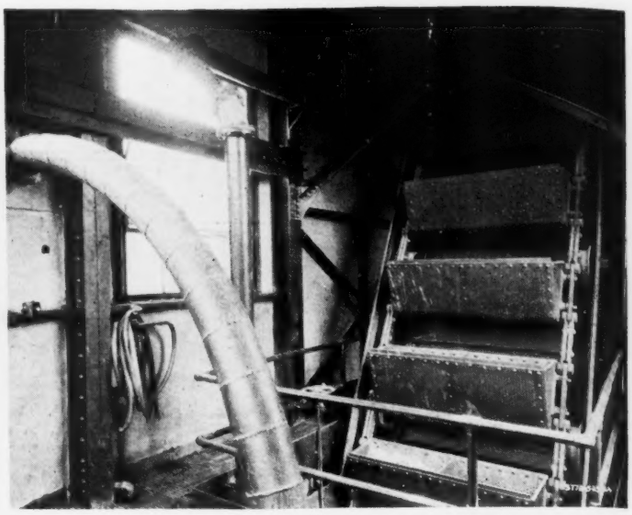
How Slag Is Prepared

The blast furnaces are approximately 1300 ft. from the cement plant. As slag is discharged from the furnace, it runs in molten form into a vat where, as it enters, it is struck by a high pressured stream of water. This causes the slag to granulate to about the size of sawdust, or coarse salt. The contents of the vat are about 90% water and 10% slag and this is pumped from the vat

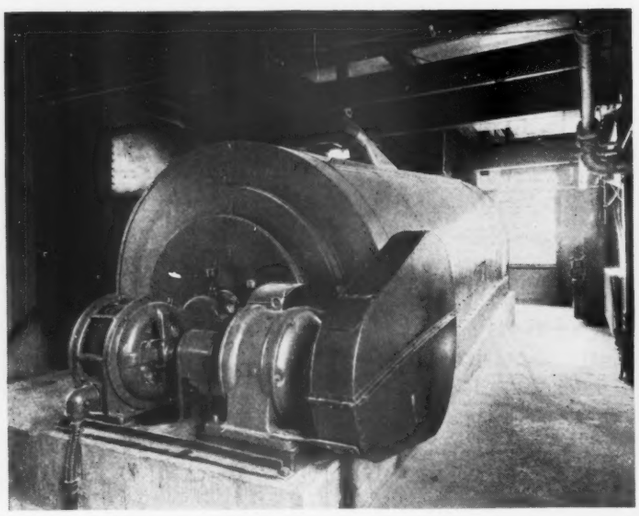


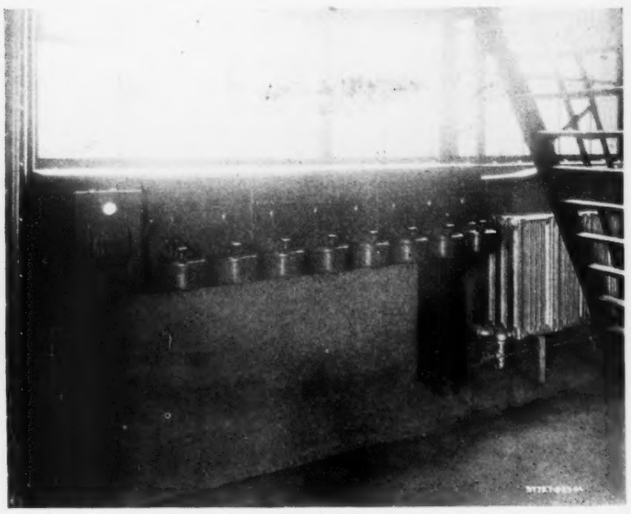
General view of the whole plant. Note its clean-cut appearance which is made possible by its tile roofs, glass sides and the cleanliness of the ground around it



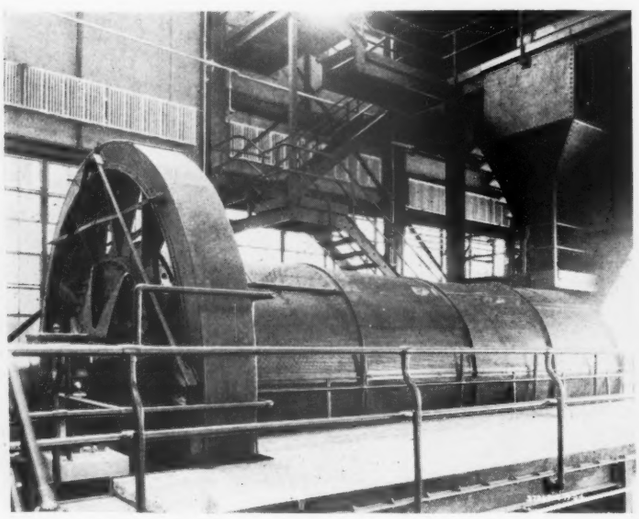


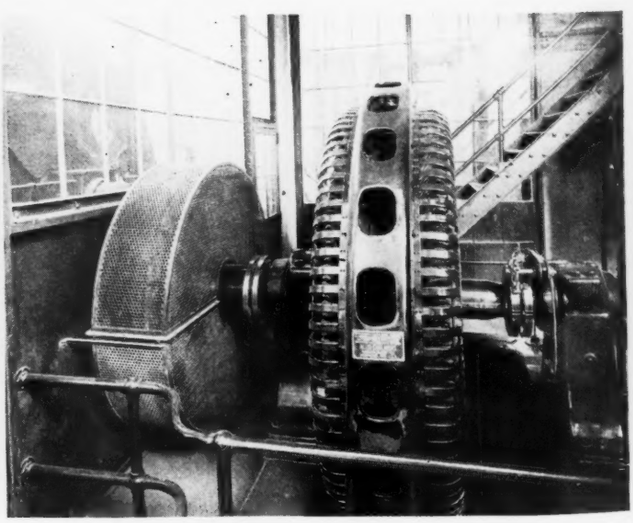
These three steel bins for stone are filled from dock storage by a large bridge crane. They hold 1200 tons; the picture at the right shows the dewatering elevator which takes the granulated slag to the raw grinding department



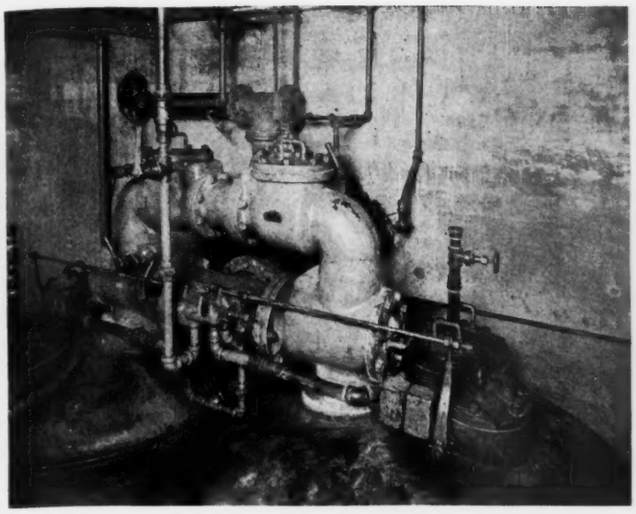


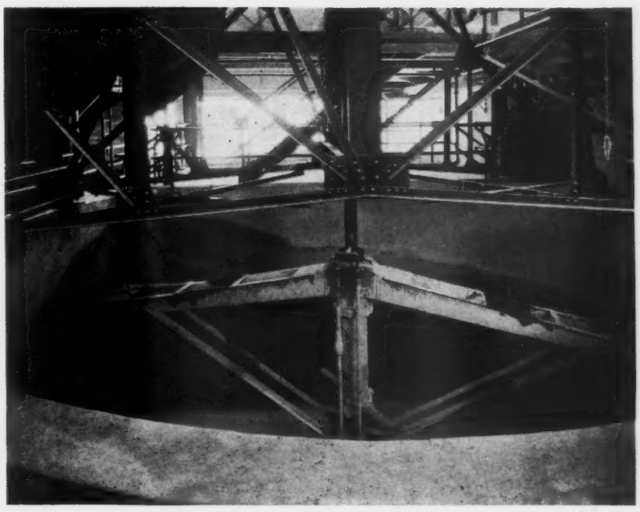
One couldn't tell by looking at the odd contraption at the left that it is a revolving screen—but it is one, nevertheless. Not one bit of dust escapes from it; at the right is shown one of the controller boards. All machinery throughout the plant is automatically controlled



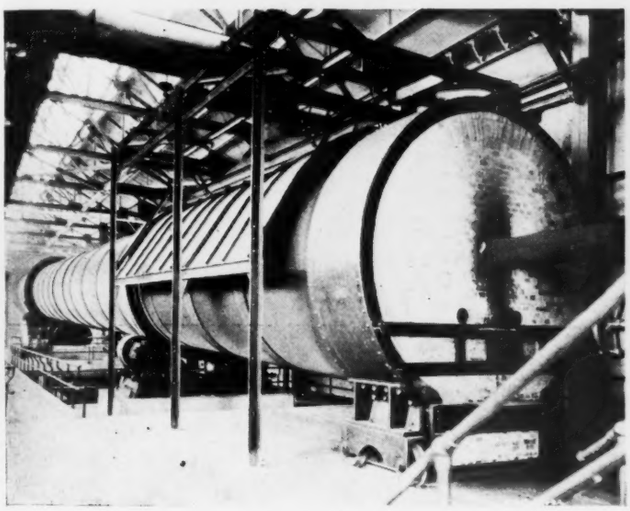


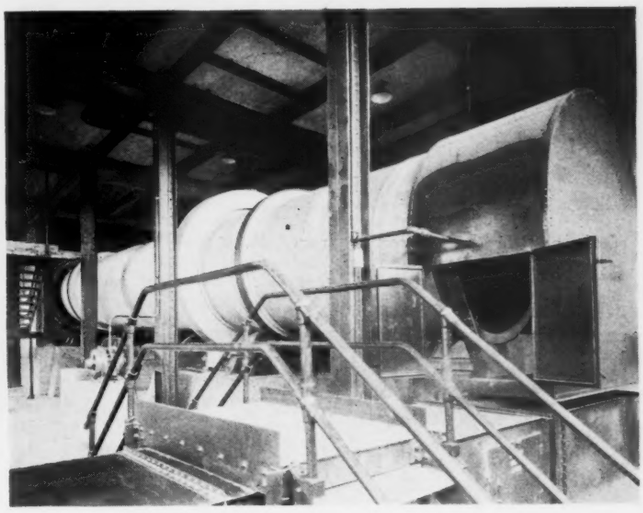
At the left is the 7x26-ft. finish-grinding mill and at the right the 500-hp. synchronous motor which drives it. Note how these pieces of equipment are enclosed and painted. The motor's surface has a piano finish



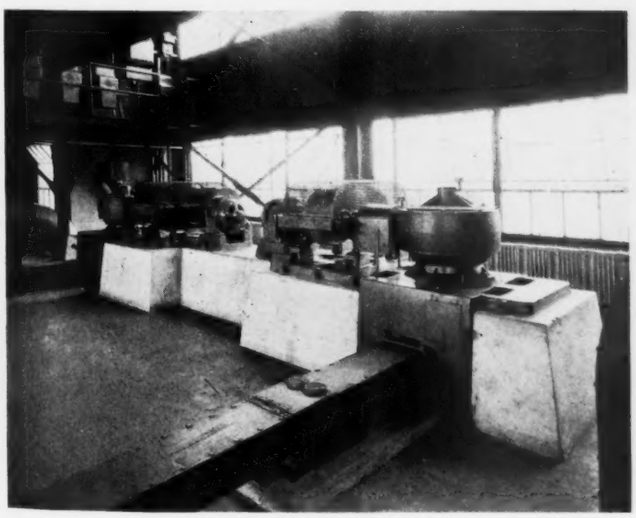


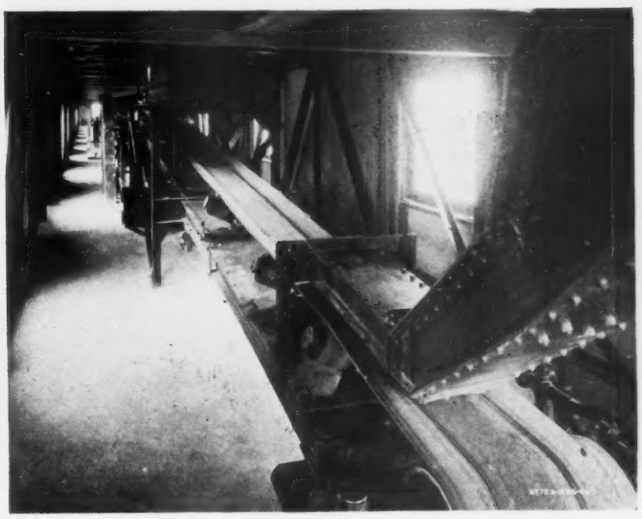
One of the air-lift slurry pumps. It and the slurry correcting basin (right) have been painted a color which matches exactly the color of the slurry





In the view at the left is shown the 10x150-ft. kiln with its apron for collecting escaping hot air. The air is piped to the coal drying plant. The main object of the apron, however, is to reduce the heat in the kiln room for the sake of the employes; at the right, the cooler, which, like the kiln, is painted with aluminum paint



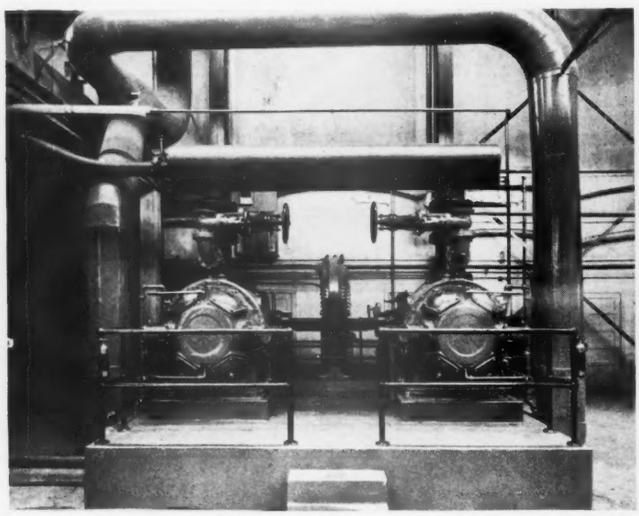


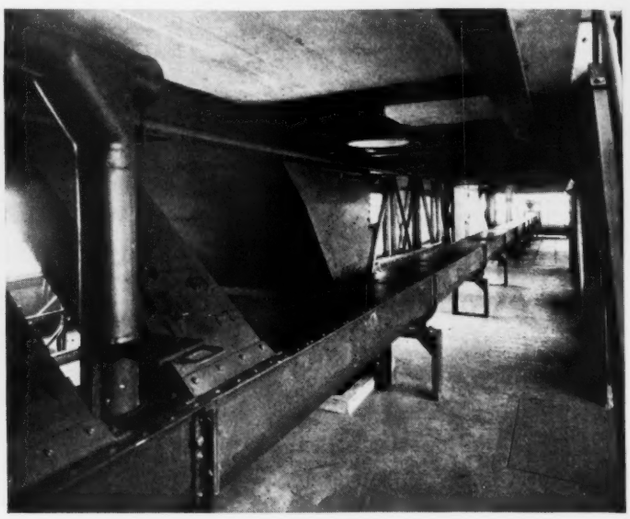
The view at the left shows the driving mechanism on top of the two coal dryers. This unusual installation permits a variable speed of the agitators. It's a pretty clean looking place to be the inside of a coal pulverizing plant, isn't it? The conveyor at the right runs over the clinker storage

through an 8-in. manganese-steel pipe line by a 6-in. Morris centrifugal pump, driven by a 75-hp. Westinghouse motor.

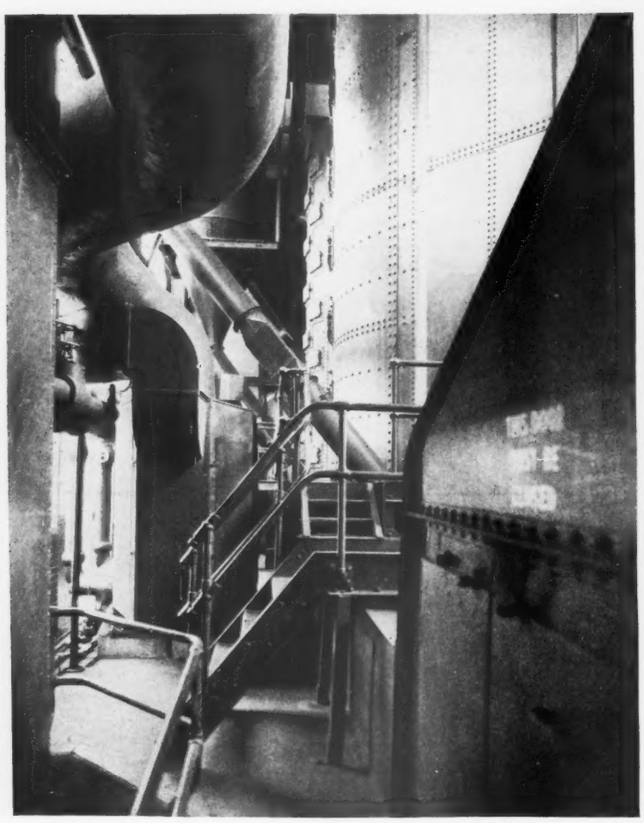
At the plant the water and slag is received in a steel-lined hopper about 10x20 ft. by 18 ft. deep. The slag being cellular, the greater part of it floats, so that the overflow pipe from the bin has to be provided with a small-mesh screen to prevent the escape of slag. The bin is at the bottom of a Link-Belt "Luhrig" elevator of 70 buckets, each holding 8 cu. ft., which are provided with ¼-in. holes for dewatering as the slag is lifted from the pit.

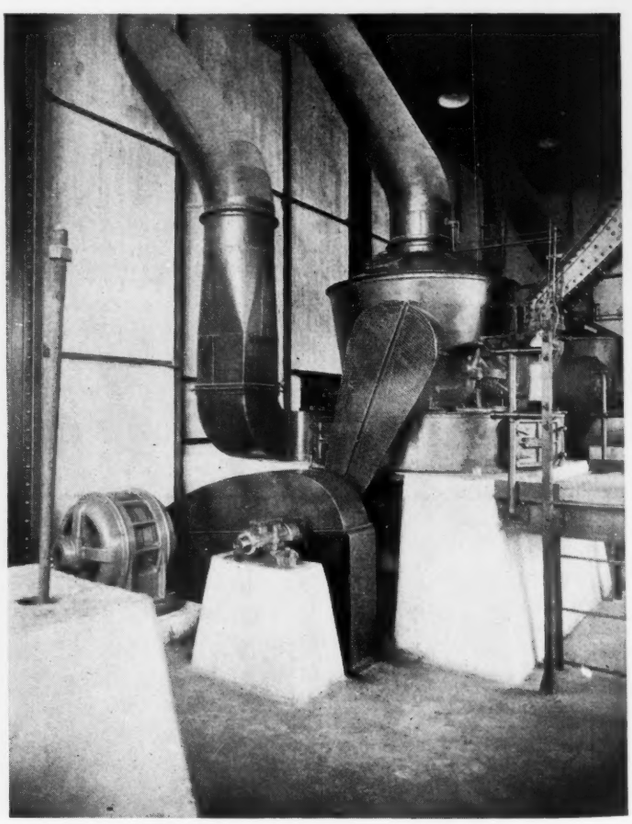
The bucket elevator empties on a 48-in. belt conveyor of 30 ft. centers, set at an inclination of about 18 deg. At the discharge end of this conveyor is a Ding's magnetic separator. Iron removed by it drops into a steel chute emptying into a steel bin below, from which it is loaded into railway cars and hauled back to the furnaces. The slag contains about 1% iron. The slag, which has been freed of iron, empties on a 36-in. belt of approximately 108 ft. centers. This belt is provided with movable scrapers so that the slag can be dumped off the belt at any desired point, falling into either of two concrete bins whose combined capacity is 500 tons.



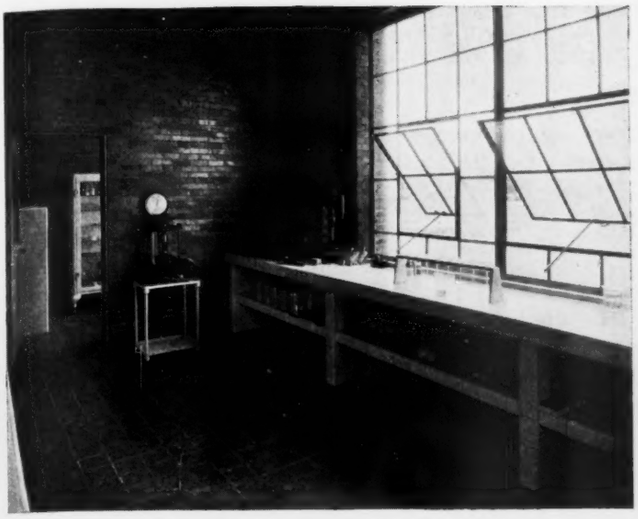


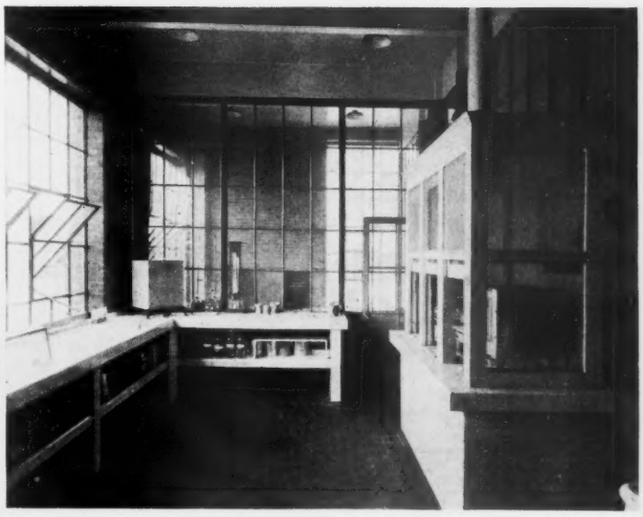
Left, one of the air compressors. Note the "paint job" they have done on it. Also note the convenient location of the fire extinguishers; at the right is a good example of how Ford conveys the finished cement. There are several hundred feet of these enclosed spiral conveyors all of which have electrically welded joints





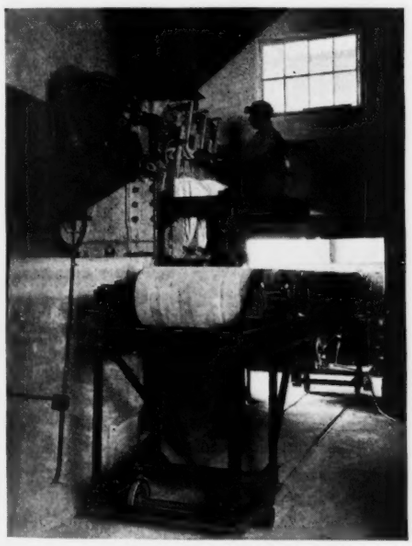
Interior views of the coal drying and pulverizing plants. Note the type of the dryer in the center of the view at left. It was built in Ford's own shops. The view at the right is a good illustration of how machinery is provided with guards. Note cleanliness





Beyond all doubt the laboratory at this plant is the cleanest, most modernly and elaborately equipped in the world. It is simply commensurate with the plant itself. Note that there are no chairs or stools

In this part of the plant is a large pivoted-bucket carrier, being 40 ft. long on the vertical by 108 ft. long horizontally, with 20x24-in. buckets. This carrier passes under the two concrete slag bins, and, if the slag



One of the two three-spout bagging machines and the movable conveyor for loading directly into cars

is not of the right mix, it carries the slag to two large steel bins where the slag is mixed with another batch. This same carrier removes the slag from the steel bins and empties it into a 60-ton bin directly above the raw-grinding mill. Alongside this bin is a bin for stone, so that the feed of stone and slag into the mill can be accurately proportioned.

Preparation of Stone

Limestone is brought from Rogers City, Mich., by boat and is unloaded at Ford's own docks, which have accommodation for 100,000 tons of this product alone. From storage it is moved by a large bridge crane into three steel bins, 430 tons capacity each. A pivoted-bucket carrier removes the stone from these bins and empties directly into a 5x16-ft. revolving screen with 2-in. perforations. The screen has an outer jacket with ¾-in. perforations, so that three sizes are produced. Stone passing through the ¾-in. holes drops into a bin directly underneath, from which it is removed and emptied into three steel storage bins having a combined capacity of about 1000 tons, by a pivoted-bucket carrier. This carrier removes stone from the bins to a 24-in. belt conveyor equipped with a Merrick scale, which in turn empties into the bin alongside the slag bin, mounted above the raw grinding mill.

Stone passing through the screen's 2-in. perforations is chuted to a bin and this size is used in the Ford blast furnaces. If there is not enough ¾-in. stone coming through in the regular run, the 2-in. size can be chuted to a small roll crusher which reduces to ¾-in. and smaller. The same carrier mentioned above takes the product of the crusher to the belt serving the bin of the raw mill. The rejections (2 to 8 in.) from the revolving screen are received in a bin from which they are loaded into cars and hauled to the furnaces.

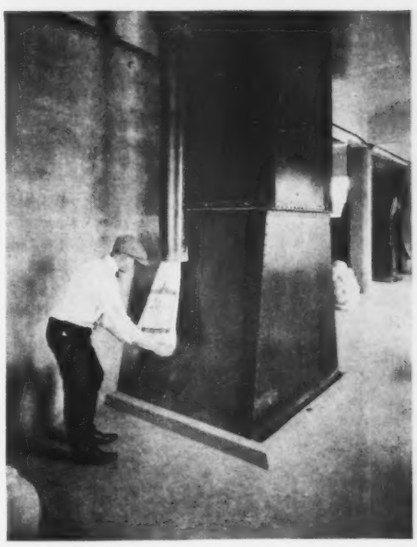
Raw Grinding and Slurry

Approximately 56 parts slag and 44 parts limestone pass through the raw grinding mill's automatic feeder, about 30% of the resulting mixture being water. This mill is a 7x22-ft. Allis-Chalmers compeb, driven by a 400-hp. Allis-Chalmers synchronous motor through a 54-in. Cutler-Hammer magnetic clutch, operating at 4600 volts.

From the mill the cream-like slurry moves by gravity into an 8-in. Allis-Chalmers compressed air pump which lifts it into six steel slurry storage tanks having a capacity of 700 bbl. each. From these the slurry moves by gravity again to either one of two 22-ft. Dorr correcting basins of concrete construction. These have specially designed agitating devices. Each is powered by a 10-hp. motor. These motors and all others throughout the plant are of General Electric Co.'s manufacture, excepting those on the pumps, which are Westinghouse. From the correcting basins the slurry is lifted by air pump to a small tank above the kiln from which it is fed into the kiln by a 12-bucket Ferris wheel feeder.

Kiln Operation and Clinker Handling

The kiln is 10x150 ft., insulated with Silo-cel and lined with Harbison-Walker fire brick. It revolves 1 revolution per 1½ minute and is driven by a 50-hp. motor through Morse silent-chain drive. A second motor is hooked up, ready for use in event of a mishap to the other. The kiln is provided with an apron, or hood, at the firing end for collecting excess hot air rising above the kiln. This air is piped to the coal drying plant. The apron, therefore, serves a double pur-



How sacks are cleaned by air. The mouth of the sack is placed over the pipe and the sack is drawn in, turning it inside out; the sack is again placed over the pipe, turned right side out and is clean

pose, as it not only keeps down the temperature in the kiln room but also makes it possible to utilize a waste heat, not utilized at any other cement plant—the radiated heat.

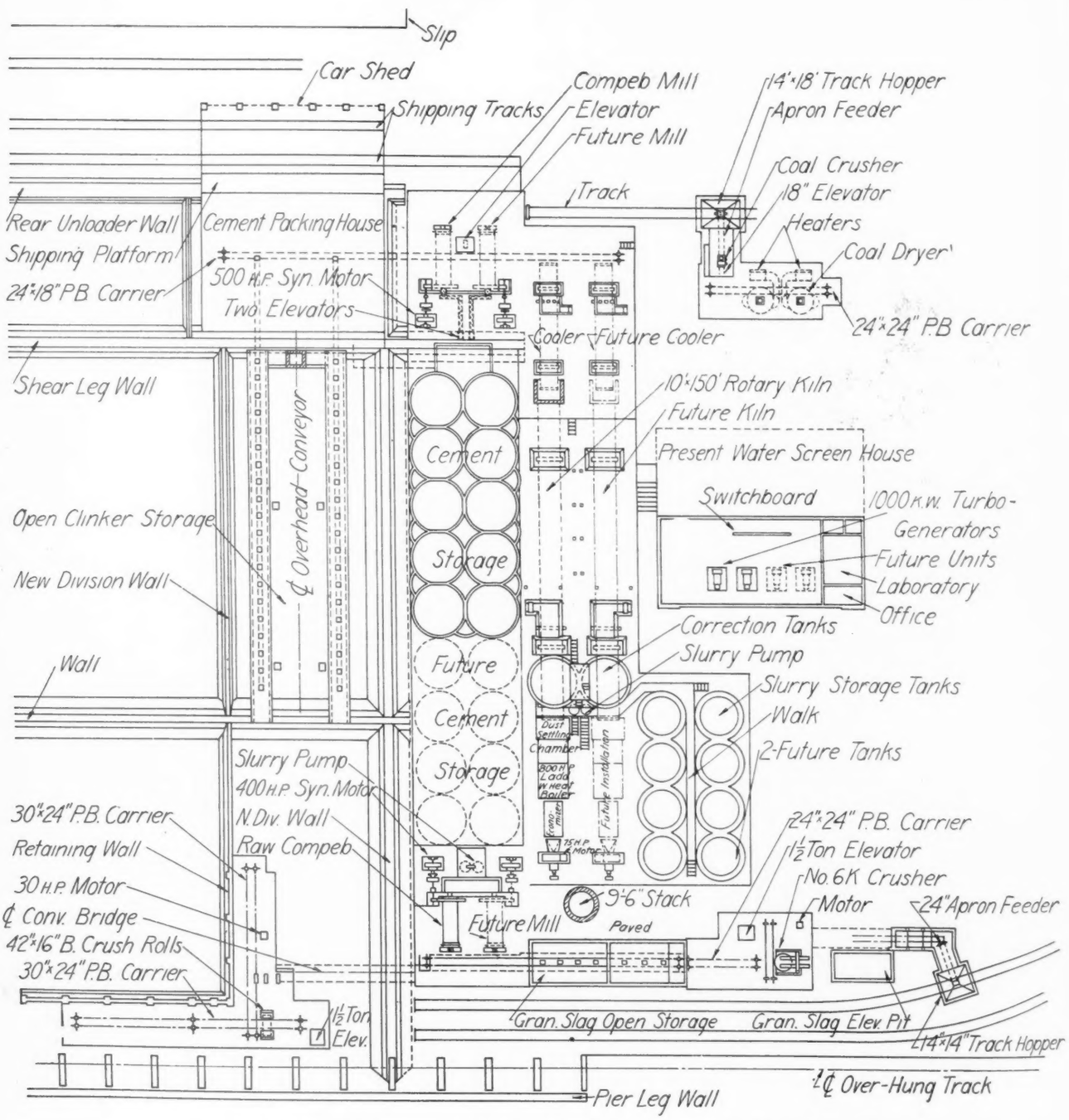
Clinker drops from the kiln directly into an 8x60-ft. rotary cooler driven by a 20-hp. motor through Morse drive. For use in an emergency, a Frederick jet conveyor is installed for chuting the clinker direct to storage. From the cooler, clinker is carried in a pivoted-bucket carrier to an outside storage, passing over a 30-in. belt conveyor equipped with a Merrick weightometer. Clinker is reclaimed from storage by two 18-in. underground conveyors of 140 ft. centers, which empty into the same pivoted-bucket carrier which takes it to storage. The carrier empties into an 8x14-in. by 70-ft. enclosed chain-bucket elevator, which in turn empties into a 175-ton capacity steel tank above the finish grinding mill. A small tank for gypsum is mounted alongside the clinker bin.

Finish Grinding

The finish grinding compeb is 4 ft. longer than the mill in the raw end, being 7x26 ft., and is driven by a 500-hp. synchronous motor through a 60-in. magnetic clutch. From the mill the finished cement is elevated and conveyed by 8x14-in. tightly enclosed chain bucket elevators and 14-in. spiral conveyors to a set of Richardson automatic scales, which dump at 600 lb. From the scales the cement goes to another elevator to the top of the storage and thence into a spiral which distributes as desired into any one of 10 silo storage tanks with intersections.

Stock and Pack Houses

The tanks are 20x80 ft., having a combined capacity of 120,000 bbl. They were built by the sliding-form method by the Macdonald Engineering Co., Chicago. Cement is removed from the silos by three 14-in. spirals, thence by bucket elevators and



General plan of 1000-bbl. cement plant of the Ford Motor Co. at the River Rouge plant

more spiral conveyors to the packers. Before reaching the bagging machines the cement passes through a coarse screen to protect the packers from damage by foreign materials such as bolts or nails which might find their way into the cement after it leaves the finish grinding mill. There are two 3-spout Bates bagging machines, operated independently of each other. As the cement is sacked it is removed by a 36-in. traveling conveyor which loads either into trucks or railway cars.

Analysis

The analysis appearing on each sack is as follows:

SLAG

Silica	30 to 40%
Alumina and iron oxide	10 to 17%
Magnesia	(Max.) 5%
Lime	Balance

LIMESTONE

Silica	(Max.) 1.75%
Alumina and iron oxide	(Max.) 1.75%
Magnesia	(Max.) 1.00%
Lime	(Min.) 96.00%

CEMENT

Silica	22 to 25%
Alumina and iron oxide	9 to 12%
Magnesia	(Max.) 5%
Lime	62 to 66%

Coal Plant

Coal comes to the plant by the Ford railway from the Ford mines in Kentucky and is dumped in a 12x15-ft. track hopper with a grizzly having 10x24-in. openings. The coal is removed from it by a 30-in. pan conveyor leading into the coal plant. This conveyor is so installed that it can either discharge into a small roll crusher or carry the coal directly to a chain-bucket elevator, depending upon the size of the coal. The elevator empties on a 30-in. belt conveyor equipped with a Ding's magnetic separator. From there the coal is carried by a pivoted-bucket carrier to two steel bins of 100 tons capacity each, mounted over the dryers.

The dryers are a Ford product. They are cylindrical, being 14 ft. in diameter and 25 ft. high. Each one has 19 horizontal compartments with agitators in each compartment. The shaft upon which the agitator arms are mounted is 6 in. square, revolved by a 15-hp. motor through Ganschow speed reducers and Reeves variable speed transmission.

Heat is received from a set of American Blower Co. coils, receiving their steam from the waste-heat boiler. The heat harnessed by the hood over the kiln is sucked into the coils by a No. 70 Sturtevant fan, thereby increasing the efficiency of the coils. The hot air leaves the coils at 300 deg. and is put to the dryers by No. 40 Sturtevant fans.

As the coal is discharged from the dryers it is carried, by the same pivoted-bucket carrier that deposited it in the dryer bins, to a spiral conveyor leading to the pulverizing plant adjoining. There are two 75-ton capacity storage tanks, each mounted above a Raymond 'Monarch" pulverizer. The pulverizers are driven by 75-hp. motors and are equipped with automatic feeds. Pulverized coal is fed into the kiln by a Sturtevant No. 8 blower. One of the pulverizers is installed only as an auxiliary unit. The two air compressors are in this same building. Both are Ingersoll-Rands, one a 2800-cu. ft. machine, the other of 1000 cu. ft. capacity. The chief use for compressed air about the plant is for the agitation of slurry.

Power House

Two-thirds of the steam required in operating the turbo-generator is generated by an 800-hp. Ladd waste-heat boiler at the kiln. It is a vertical boiler having a capacity of 200% of its rating. It is equipped with an economizer, super heater and soot blowers. Steam is transmitted from the boiler to the power house through a 12-in. line. The turbo-generator is a 750-k.w. machine of Ford's own manufacture. There are two 110-k.w. units for excitation of the turbo-generator and the synchronous motors.

Future Installations

Everywhere about the plant can be seen provision for future installation of equipment. Foundations are in for a second kiln and cooler, two additional slurry storage tanks, one each of raw and finish-grinding mills, another pulverizer for coal and eight additional silo storage tanks. Thus, it will require but little time and comparatively little work to double the capacity without in any way interferring with production while the work is being accomplished. The present plant, with its provisions for the future, is but typical of Mr. Ford's well-known methods of efficiency.

The labor policy at the cement plant is the same as at other Ford institutions. The minimum wage is $6 for an 8-hr. day.

Safety Organization of the Louisville Cement Company

STARTING January 1, 1924, the safety work at the Louisville Cement Co. was reorganized and the safety competition put on an entirely new basis for the year 1924.

The employes at Speed, Ind., are divided into two main groups, one group consisting of the brixment mill and the quarries, the other group consisting of the entire portland plant. These two groups carry on a safety competition lasting one year from January 1, 1924, to December 31, 1924, inclusive. A trophy will be awarded to the group having the best safety record for the year.

Each of these two main groups are subdivided into safety divisions—three divisions for the brixment mill and quarries and six divisons for the portland plant. Each group holds a safety contest between its own divisions entirely separate from the divisions of the other group. These contests last for six months. At the end of every six months the division having the best record in the brixment mill and quarries group and the division having the best record in the portland plant group are entertained jointly by the Louisville Cement Co.

Only accidents that cause a workman to lose time count against the record of a division.

If at the end of the first six months of the year a man is still off due to an accident which occurred during the first six months, the time lost by such a man during the second six months of the year are charged against the record of his division in the contest for the second six months of the year.

In case of a death a flat charge of 1500 hours is made against the division, all of which are charged against the record of the division for the six months' contest during which the death occurred.

At the beginning of each year all scores are cancelled and no lost time is charged against a division caused by an accident which occurred during the preceding year.

Each man's time is charged to the division of the safety foreman from whom his foreman for that day takes orders.

With the following exceptions:

(1) The time of all machinists and electricians are charged to the division to which they are originally assigned, regardless of where they work.

(2) The time of all carpenters, sheet metal workers, steam fitters and construction men when transferred from one mill to the other is charged to the division in that mill having similar crews.

All disputes between divisions in either group or disputes between the two main groups are settled by a court of arbitration, consisting of the three plant superintendents.

At the end of each six months' contest a man is considered a member of that division in which he has worked the greatest number of hours during the contest.

The safety work in each of the two main groups is carried on independently.

The assistant superintendent of each mill is in charge of safety work in his group.

There is a safety foreman in charge of each division who is responsible for the safety work in his division. A safety captain (or captains) is appointed in each division to assist the safety foreman in his work.

Each group holds a regular monthly safety inspection of its own territory independently of the other group. The inspection committee for each group consists of one representative from each division in the group headed by the safety engineer.

Each main group holds a mass meeting once every two months, at which only members of the group itself are present—except that the portland crusher-room crew will attend the meetings of the brixment mill and quarries group.

Conveying system and the well-built structure that houses Garaux Bros.' plant

Gravel Plant with Unusual Field Conveyor

Plant of Garaux Bros., Canton, Ohio, Uses Pivoting Conveyors in Steel Frames to Bring in Material from the Shovel

By George M. Earnshaw
Central Representative, Rock Products

THE sand and gravel plant of Garaux Brothers Co., near Canton, Ohio, is not a "brand" new one but has been operated long enough to iron out the kinks and troubles usually found in new plants. It was completed in the early spring of 1923 and operated all of last season, so that this year its owners are looking forward to an even larger output than last year. While the plant has a possible capacity of 600 yd. per day, it was found that by operating at a normal speed, a production of from 400 to 450 yd. per day could easily be maintained and that only six men and the superintendent would be necessary to operate it.

Close-up of conveyor gallery crusher house and washing plant

The plant is near, and on the same level with, a concrete highway. The deposit, which is approximately 45 ft. in depth, is half above and half below the highway level. It has been worked with a steam shovel and its face is now semi-circular, measuring about 400 ft. around. The material runs approximately half sand and half gravel and the overburden at the deepest point is 6 ft. deep and tapers to 18 in. at the most shallow point. At present there is enough of the deposit stripped to permit operation for half the season but stripping is soon to be resumed and the method will be the popular new one of tractor and scrapers.

Within the pit is the most interesting feature of the whole operation. Excavating is done by a Model O Thew revolving shovel. The shovel loads into a hopper and the material is taken to the plant by a belt conveyor. This conveyor and the hopper serving it are stationary, however, so that when the shovel has made a complete cut through, the hopper will be out of its reach.

This situation has been provided for by a portable conveyor which will extend from the hopper, being suspended from a post thereon, so that it will have a swing of about 300 deg. It can be swung around to the desired position by the shovel as it will operate on a pivot at the hopper. In addition there are two sections of portable conveyor one of which is 50 ft. long, the other 35 ft. The frames are of structural steel construction and carry a 24-in. belt. By

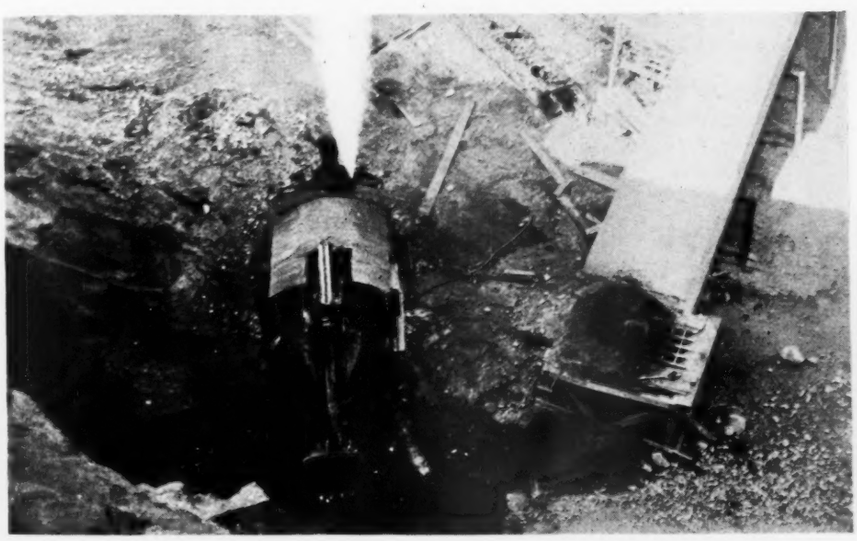
Inside the ample conveyor gallery that houses one of the 24-in. belts

Left—Steam shovel and hopper. For the next cut the hopper will be out of reach. Right—In the foreground are the steel frames for the conveyor extensions which permit the shovel to work 85 ft. from the hopper

having two sections, a full season's operation is assured without the necessity of building additional stationary conveyors. The present hopper will be within the reach of the shovel during its first cut; the 50-ft. extension will accommodate the shovel on the next two cuts and the second extension (making a total of 85 ft.) will take care of a fourth, and possibly a fifth, cut. This, it is estimated, will be ample for the season. Next spring the portable conveyors will be removed and stationary galleries will be put in in their place, and the portable used to make extensions as the work progresses.

The stationary hopper in the pit has a bar grizzly with 10-in. spacing and is 8x10 ft. at the top, tapering to a 15-in. opening at the bottom. It empties on a 24-in., 5-ply conveyor of 115-ft. centers leading to the crushing plant which is midway between the pit and the washing plant. This conveyor discharges on a steel chute which directs the material into a 48-in. by 8-ft. revolving screen of two sections, both of which have 2-in. perforations. This screen together with other screens gears, pinions, etc., were furnished by the C. O. Bartlett & Snow Co., Cleveland, Ohio.

Rejections from the screen drop directly into a No. 5 Telsmith crusher powered by a 30-hp. Ideal motor. The crusher is set to discharge at 2 in. so that its product is practically of the same size as the undersize of the screen. The material from both screen and crusher is taken by a second conveyor to the washing and screening plant. This conveyor is also 24 in. wide, but is of 140-ft. centers and is driven by a 15-hp. motor; the first conveyor is driven by a 10-hp. motor. All motors were manufactured by the Ideal Electric and Manufacturing Co., Mansfield, Ohio. Both conveyors are set at an 18-deg. incline.

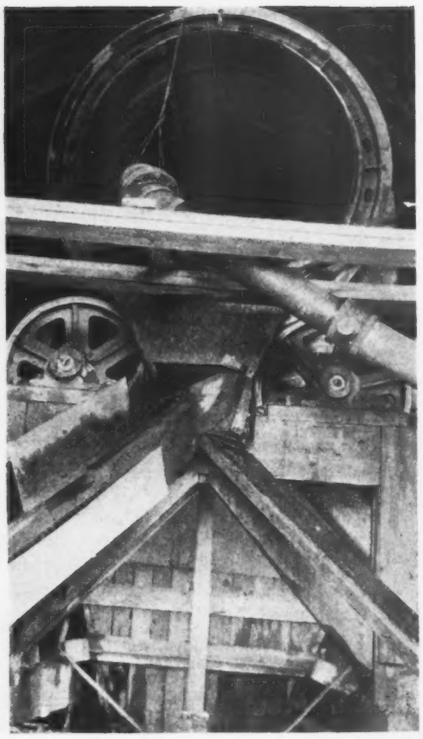


Plant hopper and steam shovel from top of deposit

In the washing plant the conveyor from the crushing plant empties directly into a 60-in. by 13-ft. revolving screen. The first two sections of it have 1-in. perforations and the third section has 2-in. holes. It is fitted with an outer jacket, 8 ft. long and 78 in. in diameter. The jacket has 3/16-in. perforations. The gravel is washed in the screen by water fed in through a 6-in. line, which is reduced to 3 in. within the screen and is perforated so that the bottom half of the screen receives a heavy spray continually. The line extends to the head end of the screen where it discharges on the steel chute feeding the screen, so that the material is well disintergrated before it falls into the screen..

The pumping system is another of the plant's interesting features. The pump is a Hill-trip type, vertical shaft, with a 60-hp. Westinghouse motor mounted on top, direct connected. The pump runs at 1145 r.p.m. and furnishes 500 g.p.m., lifting 140 ft. and

End view of plant; pump house at left



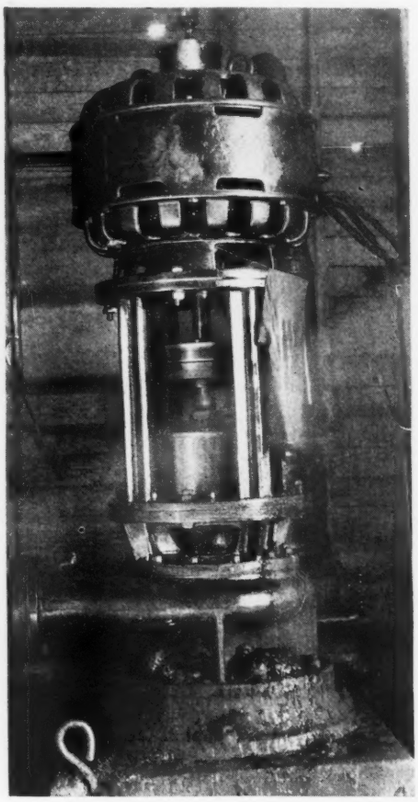
End view of sizing screen. The pipe is reduced and perforated within the screen

delivering another 50 ft. above this to the screen. It was furnished by the Midwest Engine Co., Anderson, Ind.

The sand-washing equipment was designed and constructed by the company, wooden settling tanks being used. The material passing through the 3/16-in. perforations of the outer screen falls on a gravity screen with ⅛-in. perforations, set at a pitch of about 18 deg. This screen is 2 ft. wide at the top by 4 ft. wide at the bottom and is 7 ft. long. Under it is the first settling tank which is 7x7 ft. at the top and 6 ft. deep. This tank overflows into a larger tank (8x8x7 ft. deep) and it is this tank which receives the rejections (⅛ to 3/16-in.) of the gravity screen. This affords a mixture of coarse and medium fine which makes an excellent concrete sand. The overflow from the second tank is received by another tank, the overflow of which is sluiced to a sump behind the plant.

There are thus produced two sizes of sand and two of gravel, all of which are unusually clean and which can measure up to the most rigid specifications. The company has at present a large special order for 1x2-in. gravel, but as soon as this order is filled, another crusher will be installed to produce a large volume of pea-gravel (¼x1-in.). This will be warranted because of an unusually heavy demand in that locality for pea-gravel. The company also has a big demand for its fine, or plaster-trade, sand.

The plant has a bin capacity of 600 yd., there being six bins of 100-yd. capacity each. By the use of flap gates, the distribution of the various sizes from the screen to the bins is very flexible. At the present time, two bins are used for coarse gravel, two for pea gravel and one each for fine and coarse sand. Gates are of the standard slide type and are operated by levers which are within the reach of the truck drivers, while seated behind the steering wheel. Arrangements are being made to install conveyors which will extend from under the screen, out through the side of the building and to storage piles beside the building. These conveyors will be for gravel and will be 16 in.



Vertical shaft pump and motor. It pumps 1500 g.p.m. lifting 140 ft.

wide and 36 ft. long. A 16-in. by 30-ft. conveyor will extend from under one of the settling tanks. Both sand and gravel will be reclaimed by a Model 10 Bucyrus crane (crawler tread) fitted with a ¾-yd. clamshell bucket, which will load directly into trucks.

Not including the two men which will be required for stripping, the entire operation calls for only five men and the superintendent. Two of these are on the shovel, one at the pit hopper, one at the crusher and one in the washing plant. This means that the total labor costs per month, including superintendent's salary, will not exceed $1000; the power costs never exceed $550, while coal usually averages around $125. The total operating costs therefore, are but $1675 per month, producing on an average 10,000 yards of sand and gravel.

Garaux Brothers are also contractors, and have in all, 25 trucks, ranging in size from 1 to 6 ton. These are used in part for making local deliveries, and more than 50% of the output is delivered by the company. A charge of 75 cents per yard is made for delivering.

The officials of the company are: George Garaux, president; Harry Garaux, secretary and treasurer and Harry C. Lehman, superintendent.

State Will Charge for Sacramento River Gravel

THE state board of forestry met in Sacramento, Calif., recently, to deal with matters relating to the management of state-owned strips of sand along the Sacramento river, Big Chico Creek and Lindo Channel, in Butte County.

The land in question was deeded to the state of California several years ago by the late Mrs. Annie K. Bidwell of Chico, with the object of preserving the trees along the streams. The strips of land involved are narrow, but several miles long.

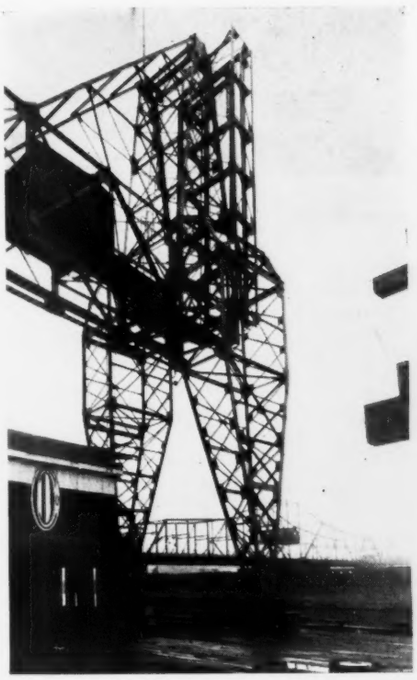
Information has been reaching the office of the board of forestry here that private parties have been entering the land and hauling away gravel from the beds of the streams. It is now proposed to arrange for a closer administration of the property and discuss the question of fixing a charge for the gravel, so the state might derive some revenue from this source.—*Sacramento (Calif.) Bee.*

Harry C. Lehman, superintendent, who designed and built the plant

Columbia Digger Unloading Plant at Portland

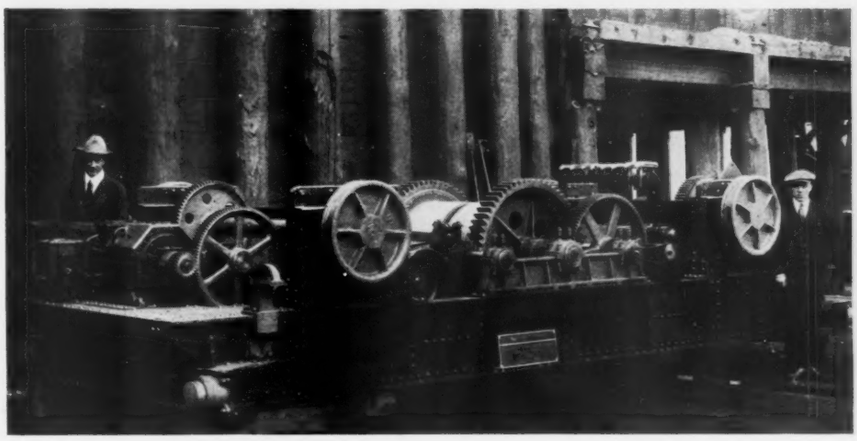
This West Coast Sand Producer Uses a Bridge Crane of Excellent Design for Unloading Barges and Putting Sand and Gravel into Storage

Control house of unloader crane

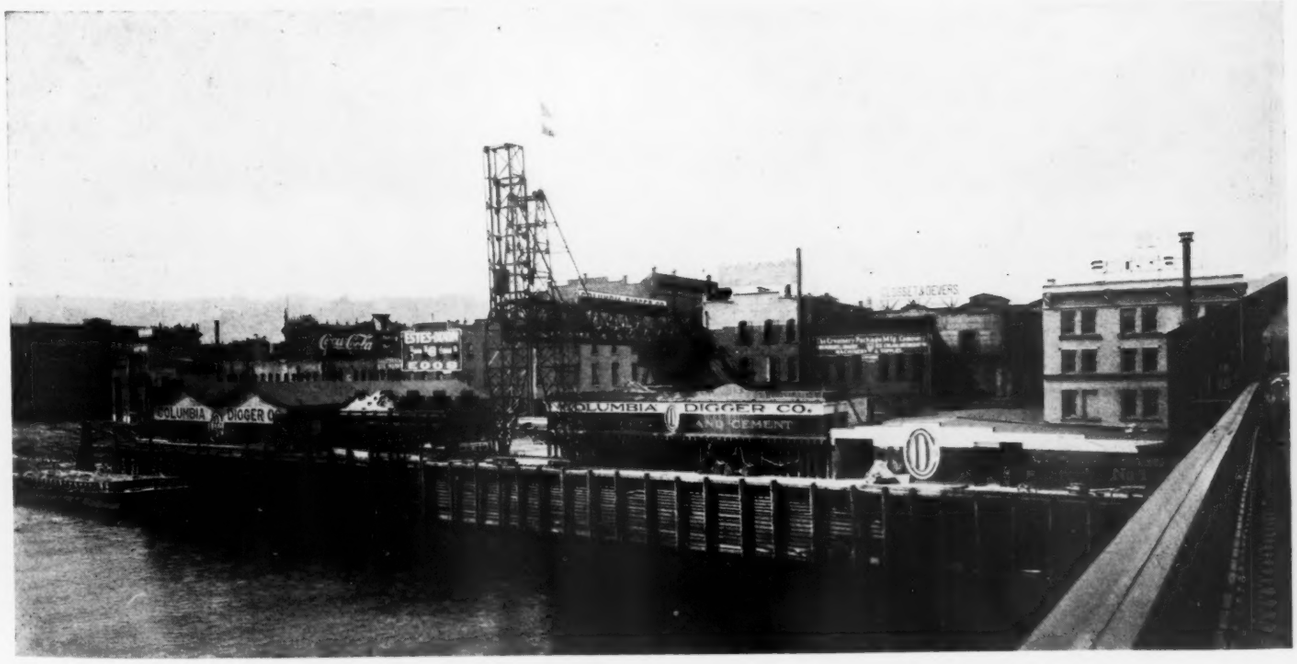


Unloading crane of Columbia Digger Co., Portland, Ore.

IN its issue of Oct. 23, 1920, ROCK PRODUCTS published a story on the mineral aggregate industry near Portland, Ore. In this was mentioned the work of the Columbia Digger Co. and pictures were shown of the dredge and unloading plant. Since those pictures were taken the business of the company has more than doubled (as business has a habit of doing in the lively towns on the West coast) and a new unloading plant has been erected.



Hoist before installation on unloader crane



Waterfront view of Portland, Ore., showing location of Columbia Digger Co. office and unloading plant

Method of construction sand barges on Columbia river

Another view showing structural details of sand barge

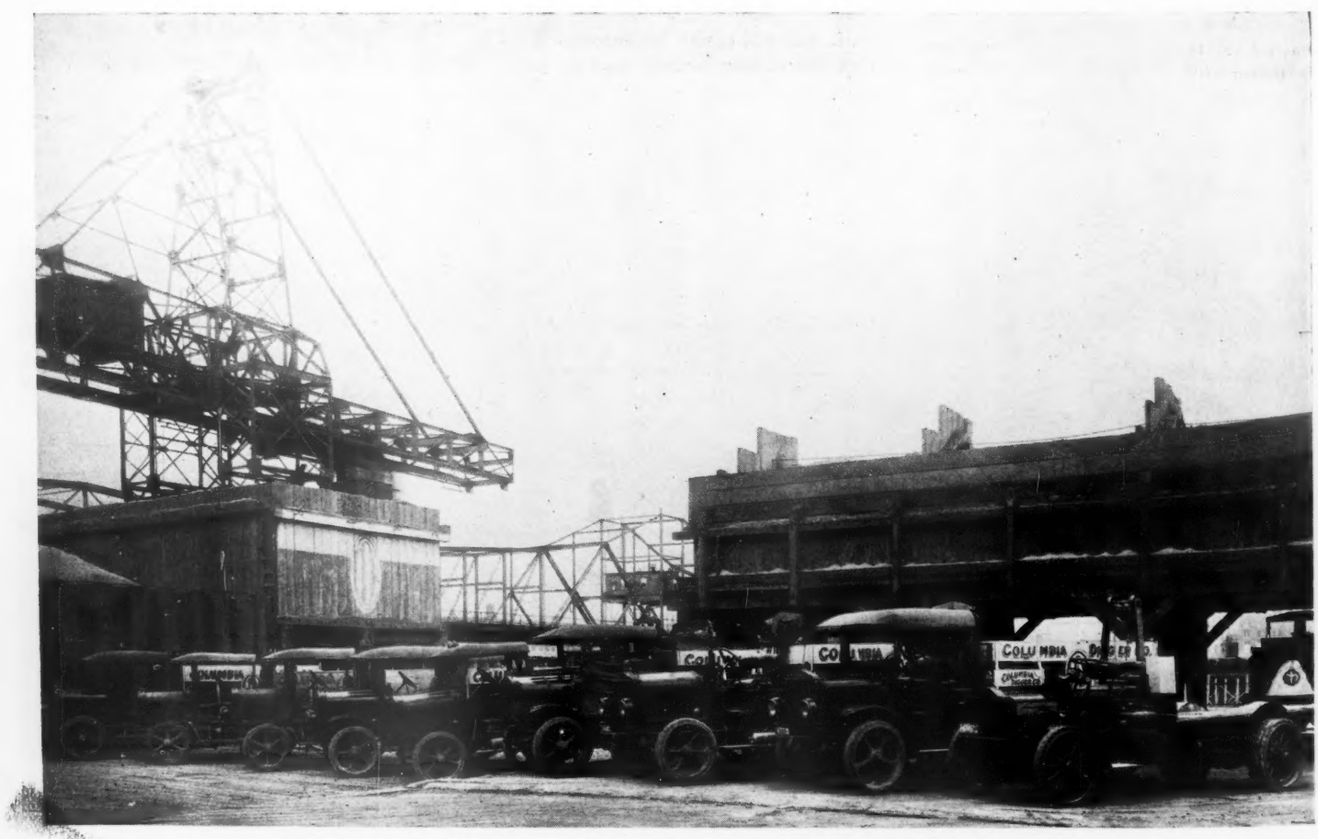
The unloading plant is a bridge crane which may be spotted over any one of a set of bins erected on the wharf on the Columbia river. The construction is all of steel. The cantilever which extends out over the water can be folded up against the main structure to allow vessels with masts to draw alongside of the wharf.

The bins, or "bunkers," as the West coast prefers to call them, are of solid timber construction. A noteworthy improvement over the ordinary form of bin is shown in the building of the ends and partitions, which are carried up roughly in a triangular form corresponding to the angle of repose of the material. In this way a considerable increase of bin capacity is obtained without going to the expense of building up the sides.

Local delivery in Portland is by truck and the company maintains its own fleet, which is shown in part in one of the accompanying pictures. The trucks are loaded from bottom discharge gates in the glaciated regions of the Middle West. It bunkers. Ample space is provided for turning and backing in to the position for unloading so that more than one truck may be loaded at a time.

The company builds its own barges and two of the pictures given here are details of barge construction, one showing the way the "rake" at bow and stern is made and the other the deck timbers.

The sand and gravel of the Columbia river does not at all resemble that which is dredged on the East coast and in the is almost as black as coal, as it is formed from the breaking up of the basalt cliffs



Fleet of motor trucks belonging to the Columbia Digger Co., Portland, Ore.

through which the Columbia flows. It is of excellent quality for concrete aggregate and building purposes generally.

The dredge employed is a large scow on which is mounted a boom derrick. In front and under the boom is the washing and screening plant. The dredged material goes to a hopper and then to screens. The oversize of the screens goes to two jaw crushers and the crusher product is returned to the screens by a bucket and belt elevator.

Of course there are no bins on the dredge, and the material is loaded into barges as fast as it leaves the screens. The gravel is either "1½-in." or "1-in." in size and only one size is made at a time which means that screens have to be changed whenever it is desired to change the size of the product.

Originally a set of 4-jacket screens was installed of a type developed by the company. These are illustrated in the issue of Rock Products referred to. But these were found too small for the desired capacity and their place has been taken by Hum-mer screens.

The company has an artistic trade mark, "C. D. Co." in a circle, which may be seen on the end of the bunker in one of the pictures.

U. S. Bureau of Public Roads Not to Make Tests for Private Parties

ON JULY 1, 1924, the U. S. Bureau of Public Roads discontinued the general practice of testing samples of road materials for any citizen of the United States as has been the practice heretofore.

Samples will be tested only when submitted by or at the request of a representative of the United States Government, or of a state, county, or municipality, and then only when accompanied by a statement to the effect that the sampling was done by a disinterested party. This statement must be made on a special form T-206 of the Bureau of Public Roads and must include the name and title of the one taking the samples.

Sand Company Stands for Sportsmanship

WARNING signs are to be placed about the lakes of the Lincoln Sand and Gravel Co., of Lincoln, Ill., according to George Armstrong, of the company. The warning which the signs will bear reads:

No fishing except with pole and line.

No firearms, no swimming without suits.

Grounds patrolled by Boy Scouts and members of the Ike Walton League.

Prosecution by the Lincoln Sand and Gravel Co., and the Illinois State Game and Fish Commission.

The motive in the restrictions is to give all fishermen an equal chance and do away with trot line.

Sand and Gravel Producers Sued for Drownings

TWO DAMAGE suits, asking $5000 each, have been filed in the common pleas court against the Island Sand and Gravel Co., Columbus, Ohio, by Arnold F. Rohner, 112 Mithoff street, and Joseph Breiteneicher, 110 Nursery Lane, whose minor sons were drowned July 25, 1922, in the Scioto River near the Greenlawn Ave. bridge.

A similar suit against the gravel concern was filed May 23 by Clyde Fritz, whose son, Howard, was drowned at the same time. In answer to that petition, the gravel company denied any responsibility for the boy's death, charging him with trespassing on private property, and failing to be cautious and careful in wading and swimming in the river. Attorneys for the company also say it is not customary to place a watchman to guard the gravel pits.—*Columbus (Ohio) Journal.*

If sand and gravel operators are to be compelled to add life guards to their operating forces to save boys from drowning, the overhead costs are surely going to increase.

California Crushing Plant to Have Welded Steel Frame

NIGG BROS. are constructing a steel building for the Builders' Crushed Rock Products Co., southwest of Azusa, Calif., and will install the machinery. The work started over a month ago, the contract calling for completion within 90 days.

Nigg Brothers are unique in being probably the only manufacturing plant in the west to use an electric welder on this character of work. The entire frame work of this structure is being welded together electrically.

The Builders Crushed Rock Products Co. was organized in the Colvina valley and a number of our people are stockholders in the concern.—*Covina (Calif.) Argus.*

The use of electric welds in place of rivets in structural steel buildings is one of the newest engineering developments.

New Bulletin on Hydrated Lime in Concrete

THE National Lime Association, 918 G street N. W., Washington, D. C., has just issued Bulletin No. 331, entitled "Hydrated Lime Makes Concrete More Workable."

This bulletin is based upon work done at the U. S. Bureau of Standards and presents in simple style the results there secured. A satisfactory test for checking the results so readily seen in the field has long been sought. Such a test has been found and the results given in this bulletin show conclusively that hydrated lime materially improves the workability of concrete without deleterious effect upon its compressive strength. The curves given on page eight present graphically the effect of varying amounts of hydrated lime upon both the workability and strength of the concrete mixes most frequently used.

Copies of this bulletin will be sent free upon request. They may be secured from any member of the National Lime Association or from the association offices.

Fuller's Earth in 1923

THE largest output on record of fuller's earth is reported by the Department of Interior through the Geological Survey working in co-operation with the state surveys in Alabama, Florida, Georgia and Illinois. Fifteen operators in six states reported that 149,134 short tons of fuller's earth were sold in 1923, valued at $2,247,523, or $15.07 a ton. This output is 7% greater than that of 1922, but it is nearly four times the output of 1913. The value of the output for 1923 was the third largest that has ever been recorded, and was exceeded by that of 1920 and 1922. It was six times as large as that of 1913. Since 1920 there has been a steady decline in the average price per ton, the price in 1923 being nearly $4.50 lower than that of 1920.

The South continues to produce the greater part of the output. Florida was the leading state in output and value, as it has been from the beginning of the industry. Georgia was second and Texas was third in output and value. These three states reported about 92% of the output and value in 1923. The producing states in the order of their output were Florida, Georgia, Texas, Illinois, Massachusetts and Alabama.

Imports of fuller's earth, which at one time constituted the entire supply, reached their maximum quantity in 1914; since then they have on the whole declined and reached their lowest quantity in more than 25 years 8547 tons. The value in 1923 was $113,944, or $13.33 a ton. The value of imported fuller's earth in 1923 was the lowest since 1909.

State	1923 Short tons	1923 Value	Pct. of total quantity	Percentage of increase or decrease from 1922 Quantity	Percentage of increase or decrease from 1922 Value
New York	71,304	$1,079,322	36	— .2	— 3
Vermont	67,100	533,510	34	— 11	— 18
Virginia	26,095	960,628	14	+ 3	+ 30
California	16,144	224,838	8	+ 3	+ 20
Pennsylvania, New Jersey	8,182	82,597	4	— 2	— 5
North Carolina	6,491	89,290	3	+ 196	+287
Georgia	796	16,568	1	— 47	— 59
Maryland	580	25,500	1	— 65	+ 74
	196,692	$3,012,253	100	— 1	+ 5

A sign which every railroad traveler on the N. C. & St. L. remembers

Modern Lime Plant That Makes Own Power

Gager Lime Plant, at Sherwood, Tennessee, Famous Not Only for the Production of Chemical Lime but for Its Excellent Construction and Design

THE Gager Lime Co.'s plant at Sherwood, Tenn., is known, not only in the Southeastern states where so much of its product finds a market, but in many other parts of the United States, on account of the high quality of its product and the efficiency of its operation.

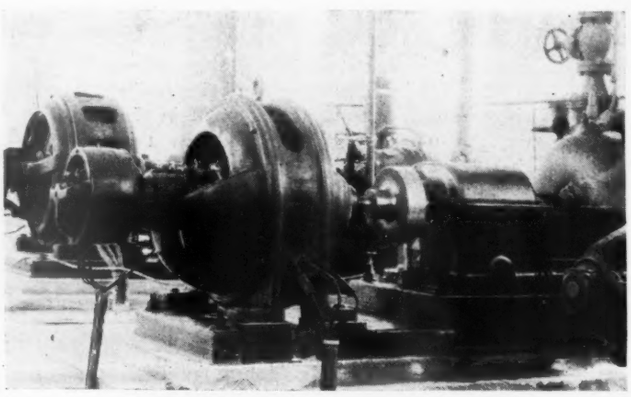
The plant is one of the best constructed in the country, not only from an engineering and operative point of view, but from the standpoint of permanence and good appearance. Concrete blocks, made of limestone screenings, are the material most employed and the effect is that of fine cut-stone construction.

A fairly complete description of this plant was published in ROCK PRODUCTS for July 17, 1920, but since that date, as is natural with such a progressive enterprise, a number of improvements have been made. The principal improvement is that of a new power plant which has just been completed and put into service.

This plant is installed in a very handsome and well lighted structure of concrete blocks. The steam is furnished by three boilers, one Stirling and two of the tubular type, which have been in service for some years and which are in an older structure. In the new plant there are three turbo-generator sets. The largest of these is a 300 kw. set with a De Laval turbine and General Electric generator. The second set is a 200 kw. General Electric generator connected to a General Electric turbine, and the third is a 60 kw. General Electric generator connected to a De Laval turbine.

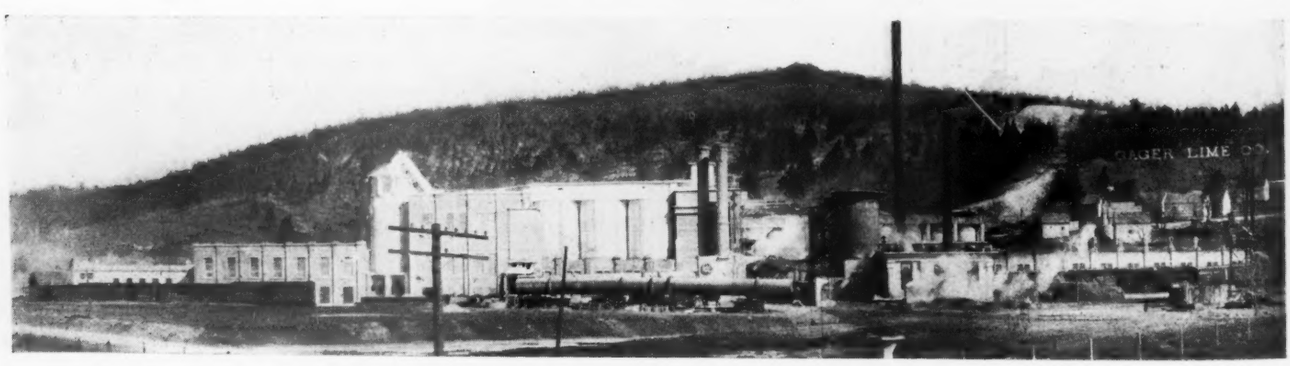
The last named runs continuously—night and day—and the exhaust steam is not condensed but piped to the lime kilns, where it is used to soften and mellow the flame, according to the modern practice of lime burning. About 150 lb. steam per hour per kiln are required for this.

The other turbines exhaust into a jet condenser of the barometric type. The condensing water and steam flow down the tail pipe to a spray pond, where they are cooled for reuse. A water softener and filter are a part of the installation and these insure that no scale will be formed in the boilers and that "blowing out" of sediment is avoided.



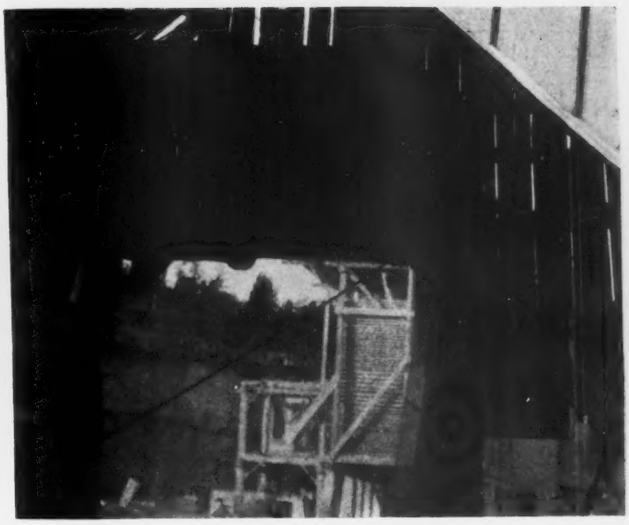
Interior of new power plant

The lime plant has 16 vertical shaft kilns and one rotary. The shaft kilns are built of sandstone-concrete blocks lined with fire-brick, a construction that prevents losses by radiation. The shafts are 40 ft. high and 12 ft. in diam-

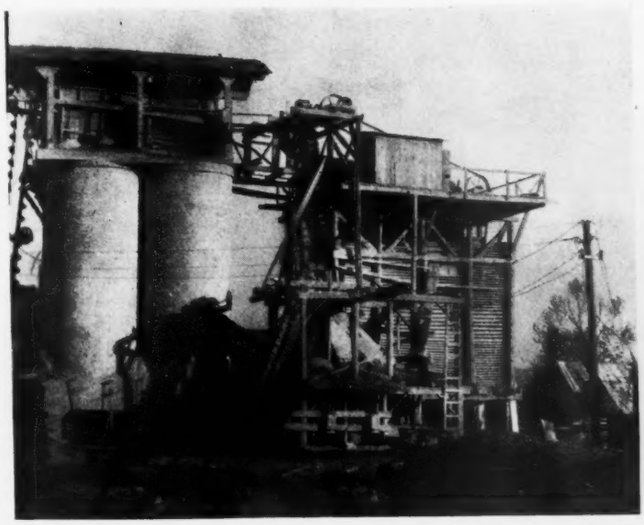


General view of plant and company houses at Sherwood, Tenn.

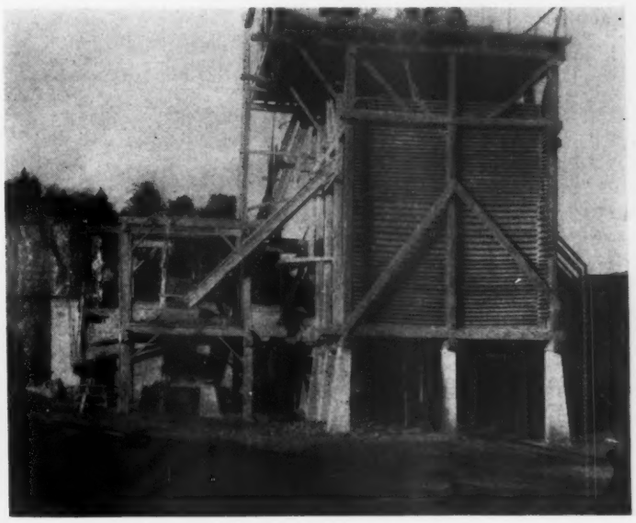
Face of quarry



Suspended gravity hoist



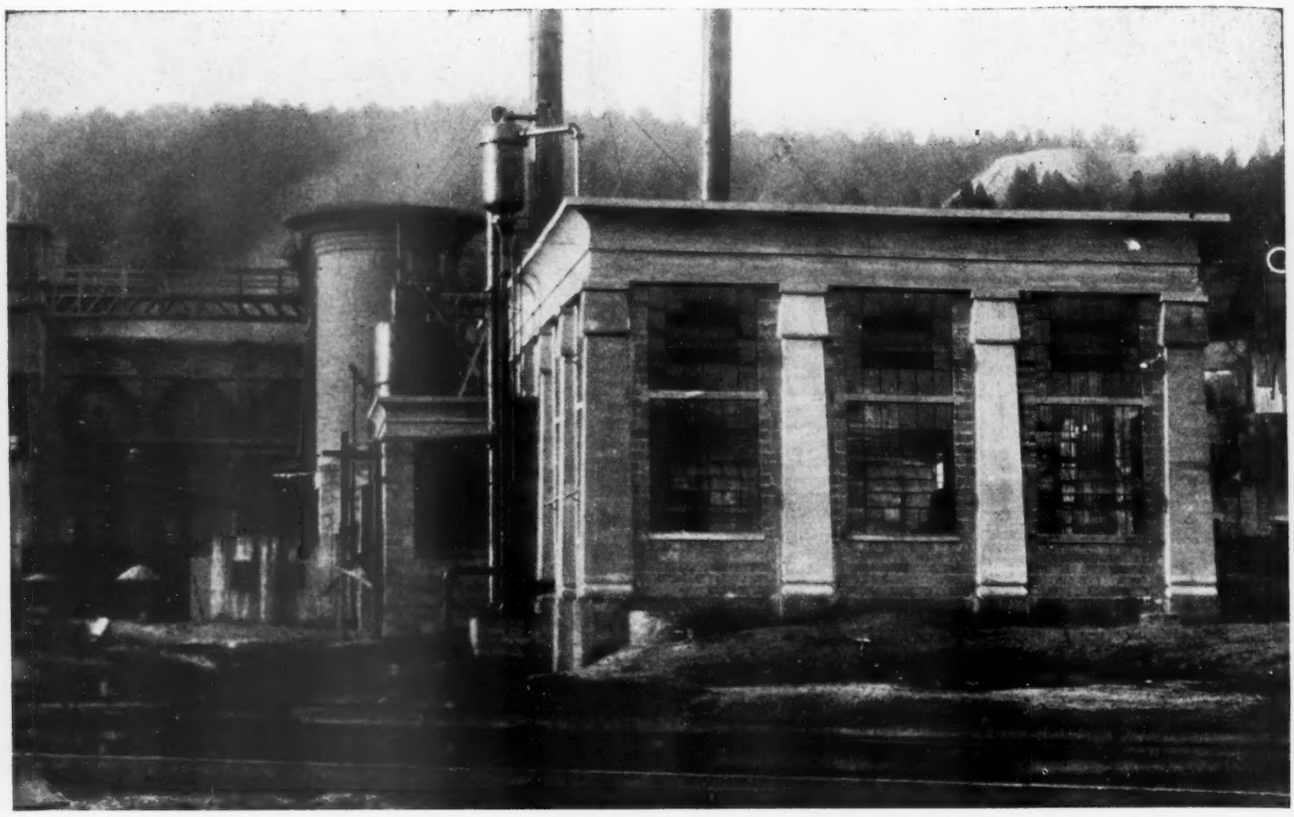
Crushing plant. The output is principally railroad ballast



End view of plant, bin and recrusher for rotary kiln feed

Bottom of incline showing branch to kilns

Exterior of the packing plant



The new power plant of the Gager Lime Co.

eter but narrowed to 6 ft. at the throat.

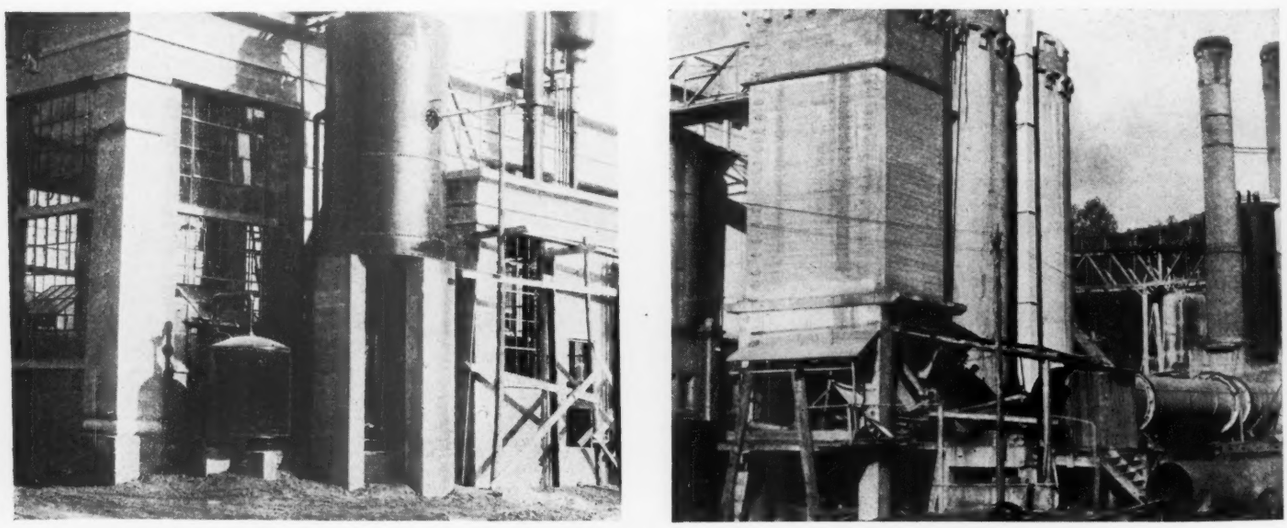
Instead of draw shears there is a tight gate at the bottom of the cooler, 24x30 in., which is effective in preventing air from getting into the kilns. Below this gate is a Stevens-Adamson drag chain conveyor by which the lime is pulled out to the drawing floor, from which it is taken by conveyors to the crusher and either to be barreled as lump lime or by a conveyor to the hydrating plant. This chain drag has to be very strong, as it must often crush lumps of lime to free itself. This system of drawing is considered one of the superior features of the plant.

The hydrating plant consists of a large Schaffer continuous hydrator and two Raymond pulverizers and air separation systems of the ordinary type.

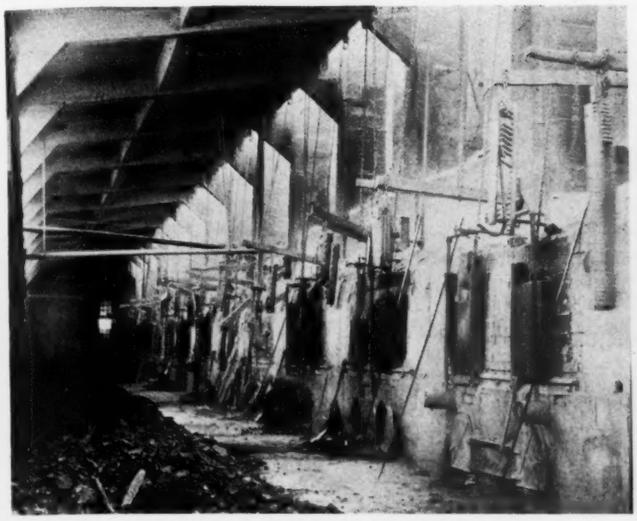
Beside the shaft kilns there is a rotary kiln 66-in. diameter and 60 ft. long. This is not run continuously but only to meet the peak demands of the market. Pulverized coal is used as fuel. An interesting fact about this rotary kiln is that gas tar was used for a time as fuel. But the supply gave out, the company who produced it as a byproduct finding a good market for it in England, to which the whole output is now exported.

Another rotary kiln was at one time in use and is now being placed on new foundations preparatory to being put in service again.

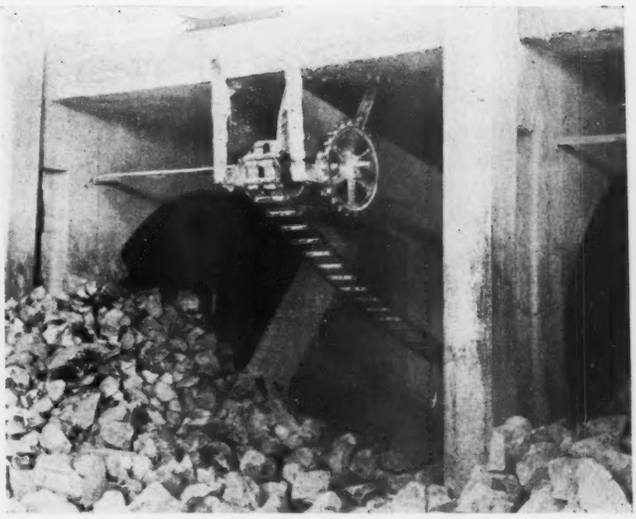
The quarry is about a quarter of a mile distant from the kilns and the two are connected by a gravity railway or inclined plane, which is one of the best the writer



Left: Barometric jet condensers for steam turbines. Right: Rotary kiln used to take up "production peaks"



Firing floor of kiln house



Chain drag for drawing lime from kilns

has seen. The grade has been carefully maintained by filling with crushed rock ballast so that it is solid enough to bear up a Pullman train. There is the usual spring switch and double track arrangement to permit the down-going and upcoming cars to pass, the remainder of the railway being single track.

The rope which connects the two cars passes over a long suspended drum at the upper end. This drum has a friction brake by which the speed of the cars is controlled. By suspending this drum the rope can run at the angle of the inclined plane without being passed over a sheave. This lengthens the life of the rope considerably.

The quarry face is about 1000 ft. long and more than 100 ft. high in the highest part. The usual practice is to drill the holes 120 ft. deep, which puts them about 5 ft. below the quarry floor. They are spaced 18x18 ft. and loaded with Trojan powder. A Sanderson Cyclone well drill is used.

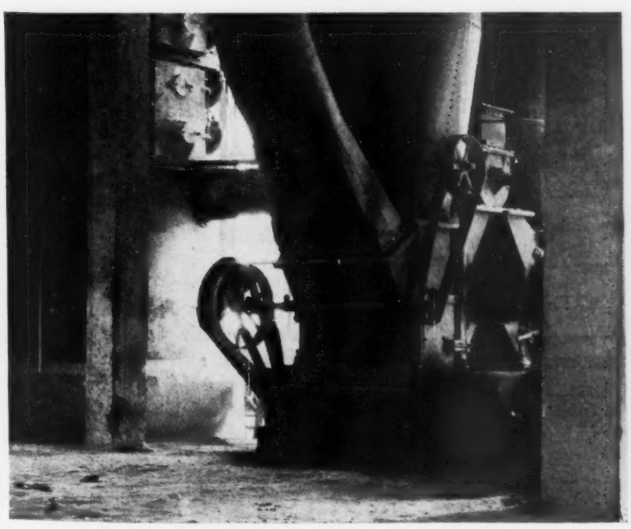
Hand loading of quarry cars is practiced, the rocks being broken to one-man size by block holing where this is necessary. The cars run by gravity either to the head of the gravity railway or to the crushing plant, which is placed on the quarry floor.

This crushing plant produces about 14,000 tons a month, the greater part of which is railroad ballast. There are two No. 6 Austin crushers, one being used as a primary and the other as a secondary crusher. There is also a No. 25 Kennedy-Van Saun crusher, which is used as a re-crusher to prepare the feed for the rotary kiln, pieces approximately of 1-in. diameter.

The rock is as nearly a pure calcium carbonate as is found anywhere in large deposits. It contains from 98 to 99% $CaCO_3$. On this account it is much used for chemical purposes, and it is in a field where a considerable quantity of lime is needed for such purposes. There is a large quantity of acetate of lime made in Tennessee and other Southern states as a byproducts of the plants which retort wood, the principal product of such plants being charcoal for charcoal iron. Much of this lime acetate is made from Sherwood lime. The growing calcium-arsenate industry demands a lot of it and also the paper pulp industry. And the big building material market furnished by Atlanta, Chattanooga and other growing Southeastern cities of course absorbs a large portion of the output.

Most of the details of design and operation of this plant are due to its manager, W. R. Hoback, who is in charge of all operations. The main offices of the company are in Chattanooga. J. M. Gager is treasurer and general manager.

The permanence and neat appearing construction has not been confined to the plant alone. The workingmen's homes which have been put up by the company and such buildings as tool houses and oil houses are of the same construction.



Continuous hydrator and air separation system

Top of incline type of car that feeds kilns

Nature, Preparation and Use of Pulverized Coal*

Part XIII—Continuation of Description of Burners

By Richard K. Meade
Consulting Engineer, Baltimore, Md.

IN MOST furnace work the quality of the flame plays some part. In metallurgical and chemical work, the chemical nature of the flame must often be considered, that is whether the flame is reducing or oxidizing in its nature, while for cement and lime kilns the temperature of the flame, must be considered. In using pulverized coal, therefore, it is important to know how to regulate both the chemical and physical characteristics of the flame.

A reducing flame is one which contains carbon monoxide or unconsumed carbon or both. While an oxidizing flame is one in which the percentage of these is very low and in which there is a considerable excess of oxygen. The former condition (reducing flame) is obtained by employing less than the theoretical quantity of air required to burn the coal, while the latter is obtained by the reverse of this. A neutral flame is one in which approximately the theoretical quantity of air is employed. This applies not only to the air used for carrying the coal into the furnace but also to that allowed to enter at openings, etc., in the furnace. In fact, since the quantity of air introduced with the coal is seldom so much as that required by theory for even a neutral flame, the chemical quality of the flame is usually controlled by regulating this secondary air supply.

The relation between excess air supplied and temperature has already been fully explained in a previous article and need not be repeated here except to say that the temperature drops in direct proportion to the increase in air employed over the theoretical amount.

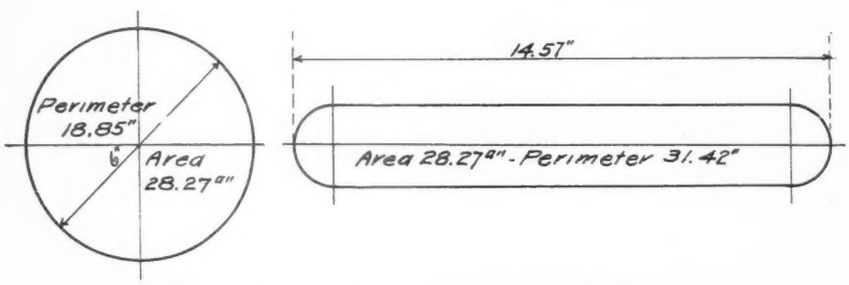


Fig. 39—Relation between circular and oblong jets

The rapidity of combustion also plays some part in the intensity of a flame although theoretically it does not enter the consideration of temperature obtained. The combustion is most rapid where the surface exposed by the coal to the oxygen of the air is greatest. Hence the finer the coal is ground and the more thoroughly the air and coal are mixed the more rapid will be the combustion. The combustion will also be more rapid where the air mixed with the coal is near the correct amount required by theory for the perfect combustion of the coal.

Where an intense flame is desired therefore, the coal should be finely ground and the air supplied with the coal should be near the theoretical amount and the coal well distributed through the air. Where a lazy slow flame is desired the coal need not be so finely pulverized and the air supplied with the coal should be only sufficient to carry the latter. The balance of the air necessary for combustion should be supplied through openings in the furnace walls, etc. It should be remembered that an intense quick flame is very hard on the furnace walls.

The shape of the nozzle will influence combustion to some extent. For instance, if we introduce the mixture of coal and air into the furnace in the form of a round jet, the surface exposed to the secondary air is much less than if a flat jet is used, the nozzle velocity in both instances being kept the same. Fig. 39 illustrates this. The area of the round opening 6 in. in diameter is 28.27 sq. in. and the perimeter of the opening or surface exposed is 18.85 in. The oblong opening is 2 in. wide and 14.57 in. long. It has the same area, or 28.27 sq. in., but the perimeter is now 31.42 in. Similarly four circles each 3 in. in diameter will have a total area of 28.27 sq. in. but the combined perimeters will be 37.7 in. or more than twice that of the 6-in. circle. This fact should be kept in mind in connection with burners and nozzles where the secondary air is supplied around the mixture of primary air and coal.

Furnaces

One of the most important points in the successful application of pulverized coal is the design of the furnace. It quite frequently happens that furnaces designed for hand firing are not suitable for pulverized coal. In fact, they are generally too small as the space required for burning pulverized coal is from two to four times that necessary for hand firing. If the jet of fuel and air comes in contact with a cold surface, such for example as the tubes of a boiler, the effort of the latter is to cool the jet below the temperature at which the fuel ignites and the latter will not be burned.

The rotary cement kiln offers an ideal furnace in which to burn pulverized coal. The jet of coal and air is not only surrounded on all sides by fire brick walls heated to above 2500 deg. F., but generally actually impinges partly on the material to be burned, this latter also being at a temperature only a little, if any, below the walls themselves. Added to these ideal combustion conditions, we have the fact that the furnace walls are protected from overheating by the revolutions of the kiln, for as the kiln revolves its walls are alternately exposed to the flame and the material. During exposure to the direct action of the flame, they store up heat but, as the material rolls over on the walls so heated, the latter give up this heat to the charge and so are cooled somewhat; so that the cement is burned partly by direct contact with the flame and partly by heat from the walls. With the rotary cement kiln, the lining can also be coated with a layer of the material to be burned and so protected from the scorifying action of the flame. With the cement kiln the disposal of the ash presents no problem, as it either falls in the charge and is converted to cement or else is carried out of the kiln by the exit gases.

*Copyright, 1924, by Richard K. Meade.

With furnaces, however, in which the coal must be completely burned within the furnace itself and where the walls are not protected from overheating by contact with the material treated, the conditions become more difficult. The problem of disposing of the ash must also be taken care of. The design of a proper furnace for utilizing powdered coal for firing boilers represents one of the most difficult problems connected with application of pulverized coal. Here not only must the ash be taken care of but the walls and sides of the furnace are particularly liable to destruction unless carefully designed. (The actual design of furnaces used for boiler work will be treated of under the section on "Special Applications.")

Certain general aims should be kept in mind in designing furnaces for pulverized coal. The problems to be solved are the size, the protection of the walls from overheating and scorification, and the disposal of the ash.

Size of Furnace

The size furnace should be such that the coal will be completely burned within it and at the same time it should be sufficiently large to prevent direct play of the flames on the side or bridge walls. Generally speaking very good results can be obtained with a furnace in which allowance has been made for burning in 1 hour 1.25 lb. of coal per cubic foot of combustion space. Pulverized coal has been burned in furnaces where the allowances ranged from ½ to 2 lb. of coal per hour per cubic foot of combustion space. Most industrial furnaces including boilers, however, have a combustion space equivalent to 1 cu. ft. per 1 to 1.5 lb. of coal burned per hour.

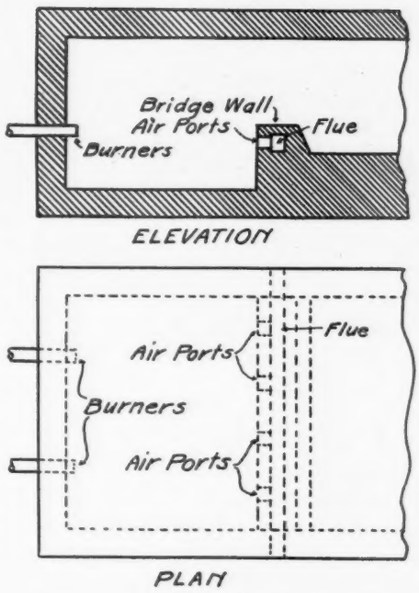


Fig. 40—Bridge wall with air ports for cooling

It is hard to determine the combustion space in the rotary kiln as hearth and furnace are one, but assuming this to end about where the "rings" form, the combustion is at the rate of 1.25 lb. per cubic foot of burning zone.

Protecting Furnace Walls

The destructive action of powdered coal, aside from actual failure of the entire brickwork due to heating this above the melting point of the brick (which may occur with any fuel), usually arises from the contact of the flames with the walls and roof of the furnace. Such contact localizes the heat and, not only wears away the wall by the cutting action of the blast of coal and air, but also actually eats away the wall by the corrosive nature of the molten ash. The most obvious remedy for the destruction of the walls and sides of the furnace is to avoid the direct impinging of the flame on any part of the brickwork. This, of course, is most easily done by making the furnace dimensions right. Often, however, small furnaces are desirable and here the problem of protecting the walls and sides of the furnace from overheating, etc., has been solved to some extent by introducing air at various points along the front and sides of the furnace and not just at the point where the coal is blown in. Where walls are subject to destruction it is well to provide for carrying the coal into the furnace with a minimum of air and allow the balance to be drawn in at openings along the sides, etc. Fig. 41 illustrates a boiler furnace and shows how the air is allowed to enter at various points along the walls of this.

Frequently furnace designers place air

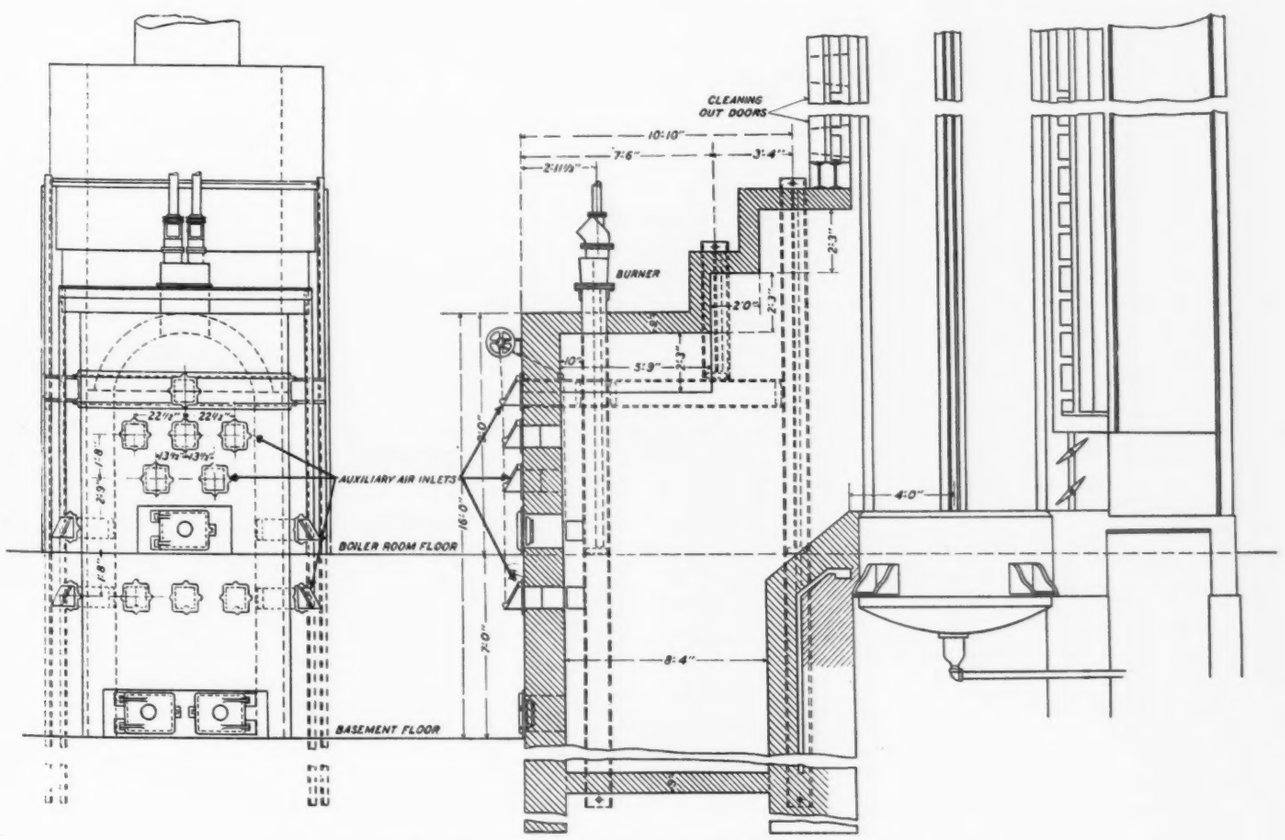


Fig. 41—Boiler furnace showing how air is admitted at various points

ducts in the side walls of the furnace and allow the air for combustion to pass through these and thence through openings into the furnace. These ducts serve not only to keep the sides of the furnace cool but also to preheat the air for combustion.

It is quite common to build reverberatory furnaces in pairs with common side walls. It is desirable here to keep this partition wall at least below the melting point of the brick. As the heat is on both sides, a solid wall has no chance to dissipate this by radiation, and hence may fail. Where it is desired to ventilate such a partition wall, a simple method is to run a flue or duct along the bottom of this wall and then have vertical ducts lead up through the center of the wall and discharge into the atmosphere. The vertical ducts can best be made of hollow tile.

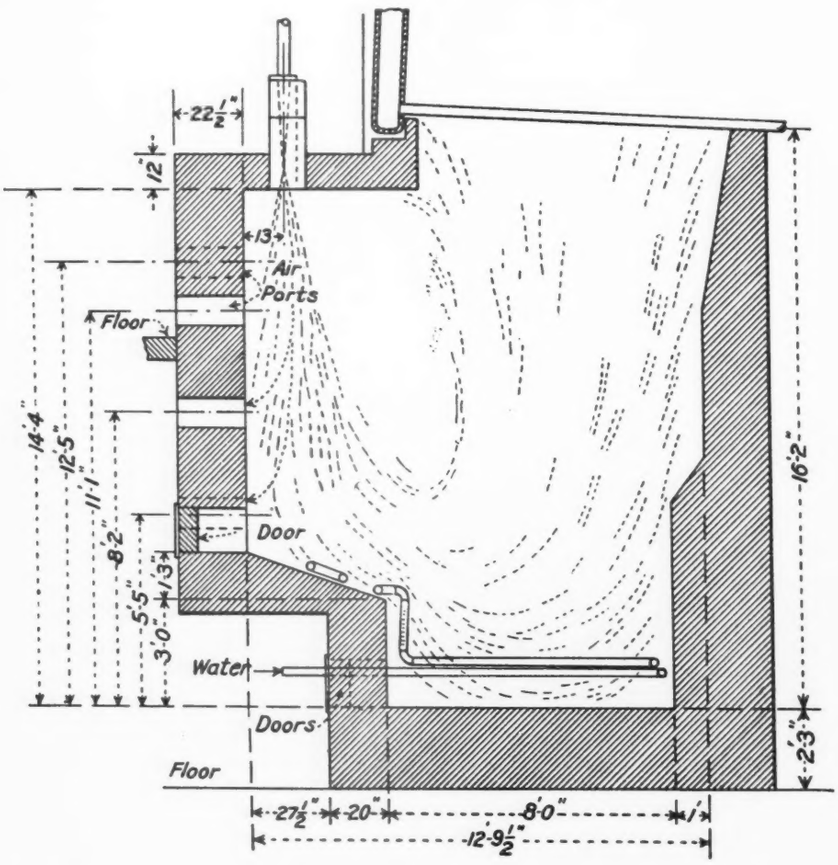


Fig. 42—Arrangement of cooling coal over hearth and near bottom of furnace

The direct impinging of the flame on the furnace wall, as has been said, is to be avoided. This usually occurs from too short a furnace, where the flame is played directly on a bridge or rear wall, or from too high velocity of the jet of coal and air. By impinging on the brickwork the effect of the flame is three-fold. First, it is that of a blow torch localizing the heat at one point, and hence overheating and melting the brick here; second, the blast of coal has the effect of a sand blast cutting away mechanically the brickwork (often already softened by heat), and third, the ash particles are blown up against the brickwork in a molten condition and flux with the latter, the ash and brick forming a slag which runs down the sides of the furnace.

One of the simplest methods of preventing impinging is to cut down the velocity of the air and coal entering the furnace. This can be accomplished by (1) using less air for carrying the coal, (2) using less pressure at the burner nozzle, and (3) flaring out the latter, or using several nozzles or burners so as to spread out the coal and so distribute the flame over the entire furnace, etc.

Water pipes laid along the sides have also been employed for cooling the brickwork in boiler furnaces, these being so connected to the boiler that no heat is lost. It sometimes happens that a flame must impinge on a bridge wall. When this is necessary, the bridge wall can be protected by laying water pipes embedded in the brickwork. The amount of water necessary to protect the brickwork is small and the loss of heat from such cooling is negligible.

Another method is to construct the bridge wall with air ports as illustrated in Fig. 40. Occasionally false walls are employed made of loose brick in order to protect the main furnace construction but these require shutting down of the furnace for repairing and should be resorted to only as a last resort. In throwing arches over furnaces it is an excellent plan to make these double so that the lower arch can be repaired or even replaced without pulling out the whole roof.

Finally, it should be emphasized here that it is not sufficient to depend on the admission of air along the furnace walls, water cooled pipes, etc., to keep the walls cool, the furnace itself must be of ample size as indicated above and the condition of the flame itself right.

Disposal of Ash

The disposal of the ash is usually provided for by designing the furnace with a deep ash hopper, or what amounts to the same thing by making the furnace somewhat higher than would be employed for hand or stoker firing and providing cleaning out doors or discharge chutes in the bottom for taking out the ash. Examples of such hoppers will be given later on.

Some engineers now employ, particularly for boiler work, a "screen" of water pipes separating the ash hopper from the combustion chamber proper. This prevents the excessive formation of slag and allows the utilization of fuels with high and very fusible ash. This screen is usually directly connected with the circulation of the boiler or preheater in order to utilize the heat absorbed by the water circulating through the pipes. This screen is usually made by running length of 2 to 4 in. diameter pipe at intervals across and about 18 in. to 2 ft. above the bottom of the furnace as indicated in Fig. 42. Where it is desired to utilize this screen for furnaces other than boilers and where no use can be made of hot water, it will be found that the heat carried off by the water is small and may be neglected without serious loss of efficiency.

The above points apply to practically all furnaces. Special furnaces are treated of in the next section.

Agricultural Limestone for Demonstration Free in Tennessee

THE Tennessee State Railroad and Public Utilities Commission has approved the application of the Louisville & Nashville railroad through the division of extension, University of Tennessee, for permission to handle free certain shipments of agricultural limestone to be distributed among the farmers in certain Middle Tennessee counties to be designated by the division of extension.

The request for approval of the offer of the railroad came to the commission in a letter from Prof. C. A. Keffer, director of the division of extension, who said that through the Herbert Stone & Fertilizer Co. of Nashville, and other producers of agricultural limestone, carload shipments of the crushed stone would be available to farmers in various counties throughout Middle Tennessee, free, for the purpose of demonstrating its value in raising red clover sweet clover and alfalfa. All such shipments, however, are to be used only under the direction of the division of extension.

Pennsylvania Silica and Gainster Producers Busy and Optimistic

Observations on a Trip Through the Quarry Country of Central Pennsylvania

By Edmund Shaw
Editor, Rock Products

GOING east from Pittsburgh to Johnstown there is little to attract the eye of the rock products man. The sides of the railroad cuts show only shale and slate with some conglomerate near Johnstown. These ledges lie flat, at the most some four or five degrees from the horizontal, for one does not enter the great folds which form the Allegheny and other mountain ranges of central Pennsylvania until the famous Horseshoe curve of the Pennsylvania railroad has been passed on the other side of Johnstown.

This is in the coal region, and it is not a lovely land to look upon, being strewn with the debris of coke ovens and marked with great black blotches where coal piles have stood. Many of the towns one passes are grimy and stained with smoke and sulphur fumes. A quarry or a gravel pit cannot lay much claim to beauty, but neither of these pollute earth, air and water as do the coal and iron industries.

However, there are some rather pretty towns interspersed with the other sort, and Johnstown, in spite of its being a large steel producer, is a rather pretty place in its business and residence centers. Only one producing plant was found near the city, but that was well worth a visit. It is really two plants under the same management and working on the same outcrop. There are two ledges, the upper being sandstone, which is crushed to ¼-in. size and finer to make fine concrete aggregate, and the lower "trap rock," which is crushed to coarse aggregate sizes. Aside from the production of this operation there is no concrete aggregate used in Johnstown and vicinity except that which is imported, gravel and sand from Pittsburgh and crushed stone from further along the line of the Pennsylvania railroad. The "trap" crushed here is really a very silicious limestone (or a calcareous sandstone if you prefer), according to the Geological Survey.

The operation belongs to A. B. Cooper,

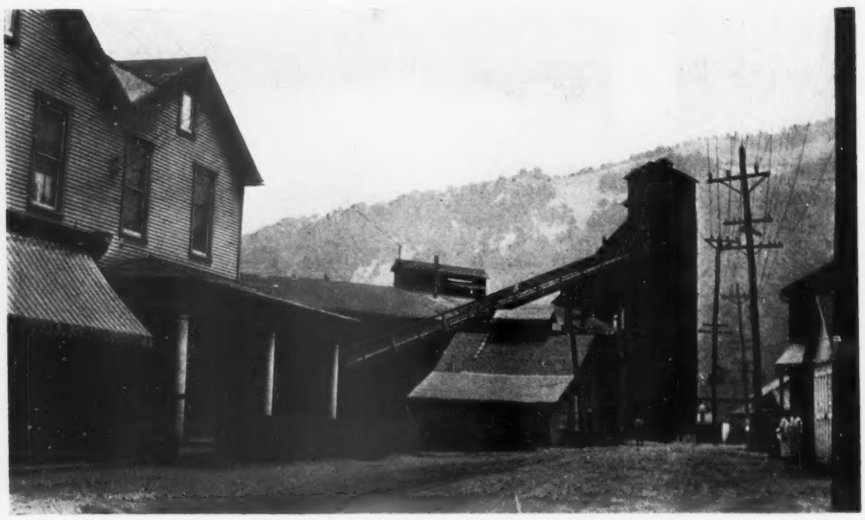
No. 2 quarry. The pinnacle in the center was left surrounded by broken stone

Part of the face of silica sand quarry near Mapleton

Inc., a company mainly composed of Mr. Cooper and his three sons, one of whom, A. B. Cooper, Jr., is superintendent. The plants are not only well run but they are full of interesting and ingenious devices, most of which were invented by young Mr. Cooper. An excellent home-made shaker screen, the hint for which came from a ROCK PRODUCTS article, is one of these. Mr. Cooper admitted that he was a faithful reader of this paper and said that the "Hints and Helps" department was always the first thing to claim his attention.

An unusual feature of this plant is the use of a "dry pan"—an edge-runner mill of the Chilian type of crushing the sandstone to fine sand. The "wet pan" or "chaser" mill, which much resembles it, is used a great deal in grinding hard ganister rock to make silica brick and also for grinding sandstone to silica sand, so the choice was perhaps natural. A description of these plants will appear in an early issue.

At Altoona one is not far from the domain of the American Lime and Stone Co. and its many plants. One of the plant managers told me this company operated 30 plants of all kinds in and around Bellefonte. To visit these would be very interesting but this trip is not in the nature of a big game hunt. However, at the invitation of H. W. Sheffer, who manages seven of this company's plants near Altoona, a visit was paid to No. 1 and No. 2 Pemberton plants near Union Furnace. These have splendid quarries, the face of one being 156 ft. high and of the other 180 ft. And it goes without saying that evidences are to be found everywhere of good management and operation.



Juanita sand plant in the village of Mapleton

A peculiar effect of a big shot was shown at No. 2 quarry. The shot not only "broke back," away from the face, but ran around a pinnacle of rock, leaving it like an island entirely surrounded by broken stone. Of course such an occurrence is welcome, as it adds enormously to the tonnage normally expected from such a shot.

The American Lime and Stone Co. has a quarry at Goodman in the same sort of "trap" as that mentioned above. Mr. Sheffer called it a "dead limestone," which is a fairly descriptive name. This plant produces only railroad ballast for the Pennsylvania road, which will use only trap rock, at least through this section. This railroad has a right to be finicky about its ballast or anything else connected with its roadbed, for nowhere does one see such long and heavy trains as one sees here. A train that was counted had 103 cars and another 118. Both trains were considerably over a mile long. The rails which hold such traffic look like structural steel members, they are so high and heavy.

The Silica Belt of Central Pennsylvania

Beyond Altoona one comes into the great silica belt of central Pennsylvania, which is so heavily worked for refractories and glass sand. "Belt" is really not the term, for the silica deposits are really only about 500 ft. thick, but they cross and recross the district in a snaky line, looking on the map, like the scrawl one would make to cross out something from it. There are two of these silica formations and they follow one another so closely that a map of one looks much like a map of the other, although they are of different geological ages.

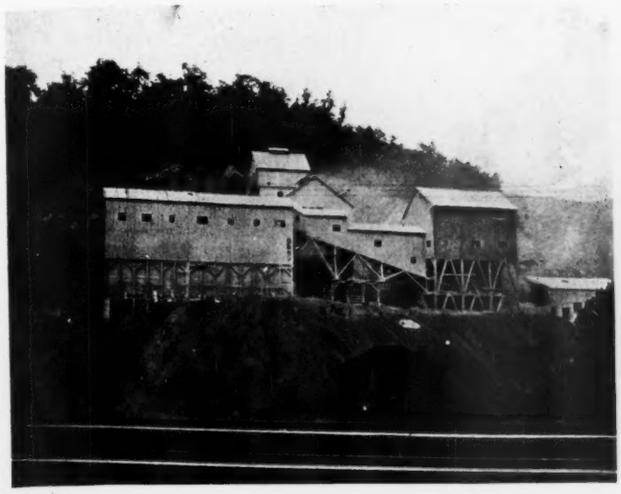
Ganister floe rock showing as white patches on the mountain side near Mapleton

The older is the White Medina or Tuscarora formation, which is of a hard light colored quartzite, a resilicified sandstone. It is called ganister in this section (a word used for a furnace lining in older metallurgical books) because from it are made the silica brick that are used for lining open-hearth furnaces, in great part, and Bessemer converters. Ganister is classified as "surface rock" and "formation rock," the latter term being applied to deeper workings. Floe rock is the term used by geologist to describe the broken and weathered surface ganister. The white exposures of this floe rock are a familiar sight as one looks on the mountain sides from the train.

Quarrying Without Drilling

I visited the surface rock workings of the J. L. Hartman Co. at Flowing Springs, near Holidaysburg, and found them to be a new and very interesting sort of quarry working. There is no drilling, the rock being broken by mud capping and sledging where necessary to one-man-stone size, so that it can be loaded into cars. This sounds simple enough, but when one knows that the workings extent across the whole face of the mountain for two miles he sees that a very considerable problem of gathering and transporting this material is involved.

The whole face of the mountain is sys-



Pemberton No. 1 plant of American Lime and Stone Co.

"Everything stands on edge in this country." Part of Pemberton No. 1 quarry

"Trap rock" quarry at Water Street, Penn.

The Juanita river trap rock quarries are on the left bank. The mountain on the right is covered with ganister

Loading ganister at flowing springs—Hartman quarry

Railroad ballast plant at Goodman of American Lime and Stone Co.

tematically opened and worked. A switchback railroad climbs up the mountain and level lines of track are run from it across the face. The broken rock is rolled down to these levels to be loaded. While several levels may be worked at once, the idea is to work from the top down, each level track being abandoned and the rails pulled up as soon as the ganister above is exhausted.

J. L. Hartman might be called the pioneer of the ganister business in America. He shipped his first carload in 1884, and previous to that date all the ganister used in this country was imported from France or Belgium. His son, J. D. Hartman, is associated with him in the business.

There are a great many producers of ganister who also manufacture silica brick in this section and the names, such as Harbison-Walker, U. S. Refractories, General Standard, Federal and many others are well enough known wherever silica brick are used.

The Glass Sand Industry

The younger (geologically) of the two silica formations is that which is so much worked for silica sand. Much of this is made into plate glass and the writer (who thought he knew something about sand) was surprised to learn that the plate glass industry requires about three tons of sand for polishing to one that goes into the actual making of the glass. Some plants like that of the Mifflin Sand Co. produce both glass and polishing sands, while others produce only one kind.

Mapleton, half-way between Lewistown and Altoona, is an important glass sand center. The Pennsylvania Glass Sand Co., one of the largest producers in the state, operates two plants nearby and is building a third which will be perhaps the largest and finest sand washing plant in the country. The buildings will be all steel and concrete and much of the machinery will be of special design, I am told. There seems to be a lot of activity in the glass sand business, for the Pittsburgh White Sand Co. has rebuilt its No. 1 plant, adding two fine circular concrete storage bins, and is rebuilding its No. 2 plant. The Mifflin Sand Co. is adding a new unit. The old Juanita plant in Mapleton is shut down, but rumor says that it has been acquired by one of the large companies and will be put in production soon.

In fact I find activity everywhere in the rock products industries and do not find on this trip much evidence of the "depression" that has clouded our newspaper columns. A number of plants other than those mentioned have been visited and they reported plenty of orders to keep the plant busy all the season, especially where highway material was being produced. I have seen new crushers and other machinery being installed and a new electric shovel being erected in the last three days in visiting plants. Railroad men tell me that car loadings are increasing. Throughout Pennsylvania only the producers of flux stone talk of lowered production and these look for an immediate increase in business.

Standard Slag Company Plant at Jackson, Ohio, Burned

THE SLAG crushing and screening plant of the Standard Slag Co., of Youngstown, Ohio, at Jackson, Ohio, was burned July 20, with a loss of from $125,000 to $150,000. George Richardson of this city is district superintendent of the company at Jackson.

The fire, which started early Sunday morning, is of unknown origin. Charles Mercer, who is nightwatchman at the plant, had made his regular rounds at about the midnight hour, and had perceived nothing wrong. Shortly afterwards, however, upon glancing over his shoulder, he discovered the entire plant ablaze.

The Jackson plant was one of the smallest of the eighteen plants owned by the Standard Slag Co., only twelve men being regularly employed there. The average production was twelve carloads a day with a maximum production of 17 cars. Only $30,000 insurance was carried on the plant.

James Straus of Jackson, superintendent of the plant, was in Bloomfield, Ohio, on his vacation and was notified there of the destruction of the plant.—*Ironton (Ohio) Irontonian.*

"Concrete Facts About Concrete Pavements"

EVERY PRODUCER in the rock products industry who sells material used in the construction of concrete roads should have in his pocket a copy of the little booklet issued by the Portland Cement Association under the above title. It is intended for a much wider distribution—for motor car owners—but it contains statistics of the amounts of cement, sand, gravel or stone required per linear foot of pavement of various widths and thicknesses, etc., which should make it a valuable vest-pocket reference book for producers of these materials.

Moreover, it summarizes the sales arguments for concrete pavements, and this is information that it is often desirable for the producer to have handy in his vest pocket. There are also summaries of the federal-aid road act and appropriations, pavement mileages, etc. Altogether C. R. Ege, manager of the Highways Bureau of the Portland Cement Association, has crowded a lot of useful information in a very narrow compass. We urge our readers to write for a copy. The association's address is 111 West Washington St., Chicago, Ill.

New Greencastle, Ind., Crushing Plant Begins Operation

THE rumbling and humming of stone crushing machinery at the new plant of the Midwest Crushed Stone Quarries Co., southeast of Greencastle was heard July 28, when the plant started operations full blast. It was music to the ears of Manager E. B. Taylor, whose quarry has been shut down since spring when the old plant was destroyed by fire.

The new structure is practically fireproof, as the frame work is of steel and the walls and roofing of zinc manufactured here by the American Zinc Products Co. It has been built at a cost of approximately $40,000 and is said to be one of the most complete plants in the United States for screening and sizing stone.

Washington Magnesite Industry Picks Up; New Plant Equipped

THE magnesite industry in Stevens county, Washington, is gradually increasing its output as a consequence of the increased demand for plastic magnesite, which is used extensively in building operations.

A new $200,000 company was recently formed by Spokane business men to be known as the Spokane Plastic Magnesite Co. A site has been obtained, and the installation of the latest type of calcining furnaces and modern machinery is planned. The new company has contracted with the Northwest Magnesite Co. at Chewelah for 5000 tons of crude magnesite per month, and will soon be in a position to market its product. It expects to make a high-grade calcine.—*Engineering Mining Journal-Press.*

Wisconsin Lime Plant Destroyed by Fire

THE Mayville White Lime works, three miles south of Mayville, Wis., was burned early July 25 with a loss of about $75,000, partly covered by insurance.

Fire started in the south kiln of unknown origin and when there were but two watchmen on the premises. The entire plant soon was in flames. Fire departments of Horicon, Mayville and Iron Ridge responded to the alarm. In addition to the plant, 100 carloads of wood caught fire, but some of it was saved. Of eight cars loaded with lime, six were pulled away safely.

The plant was supplying crushed rock for highway work between Mayville and Oconomowoc on highway 67. There is enough rock to complete the job.

One of the buildings burned has been occupied only a week, having been used in making agricultural limestone. The plant will be rebuilt.

Florida Sand-Lime Brick Plant to Move to New Location

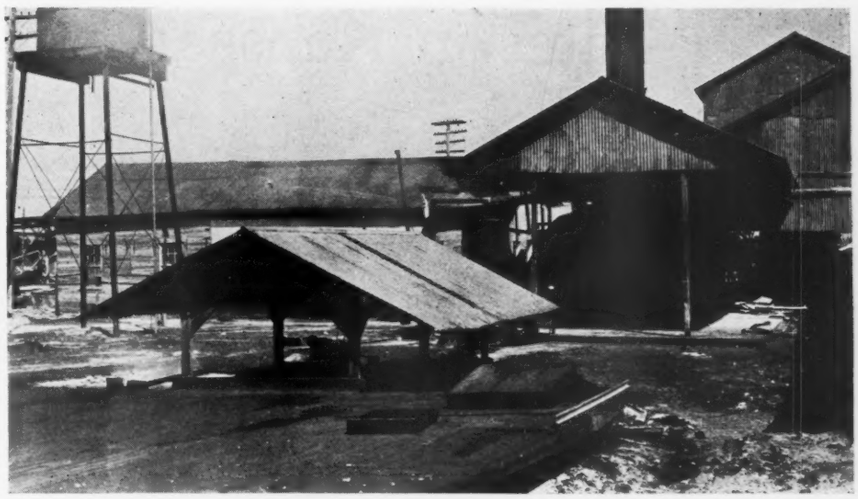
THE Plant City Brick Co., near Plant City, Fla., after several years' successful operation under unusual difficulties, in procuring its silica sand, has purchased land about one and one-half miles west of its present plant, which will be dismantled and moved to the new location. The new deposit provides enough sand for 30 years' operation or more and is said to analyze 99.69% silica. The new plant has been designed by G. W. Wilkinson, manager of the company, after visiting nearly all the important sand-lime brick plants in this country. It will have a capacity of 48,000 brick per 8-hour day, and will be so designed that this output can be readily doubled or tripled.

The site which the company is abandoning presented unusual difficulties in mining and handling the sand. Throughout the entire deposit and above and below it is a continuous network of palmetto roots, which, while not unusually tough, are wiry enough to require cutting rather than breaking. Consequently, it is impossible to dig the sand by dragline or steam shovel without getting a mass of roots and the only successful way yet found is by hydraulicking.

Even in hydraulicking a considerable quantity of broken roots and other foreign matter is taken up and care must be taken at all times to keep it from showing up in the finished product.

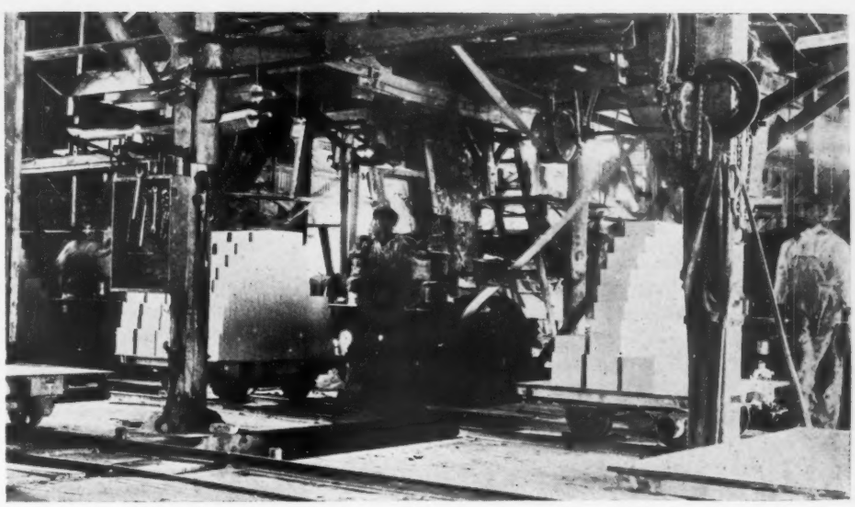
C. W. Wilkinson, manager

At the time one of Rock Products' editors visited the operation, the pump's suction line was approximately 80 ft. long and its discharge 1125 ft. long, with an elevation of 20 ft. The material at the plant is discharged on a flat sheet screen, 3 ft. wide and 6 ft. long, having ⅛x1-in. slot perforations. The purpose of this screen is to remove the roots, or trash, that passed by the ½-in. screen.



Plant City Brick Co. plant which is to be moved to new location

Interior view of Plant City Brick Co. operation



Handling the freshly pressed sand-lime brick

Would Reinstate Mileage Scale for Cement Rates in Kansas City Territory

A Rate Case of More Than Ordinary Significance to the Entire Rock Products Industry

APPLICATION of rates on cement, made in accordance with the scale prescribed in Western Cement Rates, 48 I. C. C. 201, and 52 I. C. C. 225, for hauls within Kansas and Missouri, and from Dewey, Okla., has been recommended by Examiner Leo J. Flynn, in a report on I. and S. No. 1996, cement from the Kansas City, Mo., district to St. Joseph, Mo., and related points, and in No. 15546, Iola Cement Mills Traffic Association et al. vs. Atchison, Topeka & Santa Fe. This case may be considered as a companion case to No. 14801 and No. 14911, a report in which has also been written by Examiner Flynn.

In the schedules suspended in this case, the carriers proposed to reduce rates on cement, from Kansas City and Sugar Creek, Mo., and Bonner Springs, Kan., to St. Joseph, Mo., and Atchison and Leavenworth and intermediate points. They were suspended upon protest of the Iola Cement Mills Traffic Association.

That association, complainant in the formal docket case, alleged the rates from the Iola district of Kansas and Oklahoma to destinations in Kansas and Missouri were unjust, unreasonable, unduly prejudicial and unduly preferential of competing manufacturers of cement at St. Louis, Prospect Hill, Continental, Hannibal, Ilasco and Sugar Creek, Mo., Bonner Springs and Sunflower, Kan.; Mason City, Gilmore City and Des Moines, Iowa; and that the rates from the Iola district to destinations in Kansas between Topeka and St. Joseph on the Rock Island were higher than the rates from the same points to St. Joseph, in violation of the fourth section.

Missouri and Kansas authorities were notified. The Kansas commission held a hearing jointly with Examiner Flynn, in a case on its docket in which the intrastate rates from the Kansas gas belt to Atchison and Leavensworth were assailed.

The railroads said the reductions were proposed to meet a state rate of 7 cents from Sugar Creek and Kansas City to St. Joseph via the Santa Fe, and over the Sante Fe and Burlington, as a joint rate. The examiner's recommendations are as follows:

Examiner's Finding

The commission should find that the circumstances and conditions surrounding the transportation of cement interstate and intrastate within Kansas and from Kansas City and Sugar Creek to St. Joseph within Missouri and from points in the Kansas gas belt, including Dewey to St. Joseph and intermediate points, and from Kansas City, Sugar Creek and Bonner Springs, to St. Joseph, Atchison and Leavenworth and intermediate points in Kansas and Missouri are substantially similar.

The commission should further find that the reductions proposed in the suspended schedules have not been justified and should require their cancellation.

The commission should further find that the rates on cement, in carloads, from points in the Kansas gas belt, including Dewey, Okla., to St. Joseph, Atchison and Leavenworth and related points are, and for the future will be, unreasonable and unduly prejudicial to said Kansas gas belt points and Dewey over interstate routes and to shippers therefrom, and unduly preferential of Kansas City and Sugar Creek over intrastate routes to St. Joseph and to shippers therefrom, and of intrastate traffic in Missouri between said points, to be extent that the rates from points in the Kansas gas belt, including Dewey, exceed or may exceed the rates contemporaneously maintained for like distances from Kansas City and Sugar Creek and upon intrastate traffic from Kansas City and Sugar Creek to St. Joseph and intermediate points in Missouri; and that any greater disparity in the rates from points in the Kansas City gas belt, including Dewey on the one hand and Kansas City and Sugar Creek over intrastate routes on the other hand, results and would result in unjust discrimination against interstate commerce from points in the Kansas gas belt, including Dewey. These findings should be without prejudice as to the conclusions relating to the propriety of the grouping of Kansas gas belt points that may hereafter be reached in Nos. 14801 and 14911.

The commission should order the removal of the undue prejudice found by requiring the observance of the cement scale rates prescribed in the Western Cement case from all points of origin to the destinations involved constructed on the basis there prescribed. The Western Cement case has been reopened and further hearing therein has been had for the purpose of revising the fourth section orders entered therein, so that they may be made to conform to the provisions of fourth section of the interstate commerce act, as amended, and the matter is now pending before the commission. The defendants should be required to observe the provisions of the fourth section orders entered or that may be entered in the Western Cement case.

The "Gas Belt" Group Rates

A further adjustment of Western cement rates has been recommended by Examiner Leo J. Flynn in a report on No. 14801, Missouri Portland Cement Co. vs. Atchison, Topeka & Santa Fe et al., and No. 14911, Lehigh Portland Cement Co. vs. A. T. & S. F. et al. The most important question presented by the complaints, the examiner said, was the propriety of grouping the mills in the Kansas gas belt, a group 107 miles long. The complainants, he said, were in agreement on that point, so he referred to the testimony of each in a collective sense. In referring to either complainant, specifically, he did so by mentioning the name of the mill point rather than the name of the complainant. Therefore when he spoke Iola he meant the Lehigh and when he spoke of Sugar Creek he meant the other complainant.

In substance the complaints were that failure to apply the scale rates prescribed by the commission in Western Cement Rates, 48 I. C. C., 201, and the supplemental reports thereon, resulted in rates from their mill points which were unreasonable, unjustly discriminatory and unduly prejudicial, Iola, Kan., being one of the two points of origin and Sugar Creek, Mo., the other.

Flynn said that substantial justice required that the scale rates prescribed by the commission as reasonable maxima should be applied from each mill point in the gas belt based upon the respective mileages from each mill. He further said that rates in Kansas, both state and interstate should be the same, because transportation conditions were substantially similar.

The federal examiner and the Kansas Public Utilities Commission held a joint hearing on the two cases involved in this report and on three cases before the Kansas body in which some of the questions in the federal cases were also raised.

A difference of 1 cent per barrel, the examiner said, was large enough to influence a sale of cement. A difference of 1 cent per 100 lb. in freight rates, he said, meant a difference of 4 cents in the price of a barrel of cement. Differences of ½ a cent to 3 cents were cited by the complaining mills, to their disadvantage arising from the fact that group rates instead of rates based on mileages, were in effect. Kansas City, the complainants pointed out, was only 108 miles from Iola over the direct short line and only 101 miles using the short three-line distance. The average mileage, however, from the group was 134, although the average mileages from the mills in the group by three-line computations varied from 87, from Mildred, Kan., to 194, from Dewey, Okla. Kansas City, naturally, is the big market for the gas belt mills.

Contend for Scale Rates

Complainants contended, the examiner said, that it was illogical to make the group an exception to the application of scale rates when the group was 107 miles long, particularly when the average distance, calculated from all the mill points, was 134 miles. They said that making the group an exception resulted in undue prejudice to some mills and undue preference of others. Iola said its complaint was not directed against the rates from other points, but against the relatively higher basis from that point than would be rates based upon its mileage.

Not much evidence, Flynn said, was offered by the railroads. The burden of defending the adjustment, he said, was assumed by the Iola Cement Traffic Association and its individual members with mills at various points. The association and individual companies intervened in the case. The Santa Fe witness, he said, testified that he could not tell whether the discontinuance of the grouping would have any real effect on the revenue of the railroads, but he expressed the opinion that it was unfair to the carriers to use the distance from one of the points in the group, Chanute, as representative of the distance from all points in the group. The M-K-T put forth its position in a letter which was read into the record. The official who prepared the letter expressed the opinion that the best interest of the carriers and of the shippers would be served by a continuance of the group. The St. Louis-San Francisco and the Missouri Pacific, the other carriers interested, the examiner said, offered no evidence.

The examiner referred to the prior decisions in this case and to decisions in which the commission passed on the question of maintaining groups, especially the Shreveport, Monroe and Alexandria, La., group, and then said:

Examiner's Finding

A consideration of all the evidence of record leads to the conclusion that substantial justice does require that the scale rates, prescribed by the commission as reasonable maximum rates, should be applied from each mill in the gas belt based upon the respective mileages from each mill.

The commission should find that the circumstances and conditions surrounding the transportation of cement interstate and intrastate within Kansas and from the gas belt and Sugar Creek to points in Kansas are substantially similar. The commission should further find that the rates on cement, in carloads, from Sugar Creek to points in Kansas are unduly prejudicial to Sugar Creek and unduly preferential of the gas belt and of intrastate traffic to the extent that the rates from Sugar Creek exceed or may exceed the corresponding rates contemporaneously maintained for like distances from the gas belt to said destinations; and that any greater disparity in the rates from the Sugar Creek on the one hand and from the gas belt over intrastate routes, on the other hand, results, and would result, in unjust discrimination against interstate commerce from Sugar Creek.

The commission should further find that the rates on cement, in carloads, from Iola to destinations in Western trunk line territory are and for the future will be unreasonable and unduly prejudicial to the extent that they exceed or may exceed the scale rates based on the distances from Iola, and that they are and for the future will be unduly preferential of Mildred, Fredonia, Chanute, Independence, Humboldt, Dewey, Sugar Creek and Bonner Springs to the extent that the rates from said points of origin are lower than scale rates based on the respective distances from each of said points of origin. In view of the issues in Nos. 15117 and 15138 the rates from Sugar Creek and Bonner Springs to the Kansas City district should be excepted from this finding.

With reference to Sugar Creek's complainant that the rate from that point to Dewey is in excess of the rate between those points in the reverse direction, defendants stated that this situation was brought about because Oklahoma was not within the destination territory included in the Western Cement case, although Dewey was one of the points of origin in that case. In Iola Cement Mills Traffic Association vs. A. W. Ry. Co., 87 I. C. C. 451, Scale III rates were prescribed for application in the eastern portion of Oklahoma and Scale IV rates in the western part of that state, and defendants announced that when the rates from Sugar Creek to Oklahoma are readjusted to conform to the decision in that case the rate from Dewey to Kansas City would be observed as the maximum for the rate southbound from Sugar Creek to Dewey and points directly intermediate. The defendants admitted that ordinarily transportation from Sugar Creek to Dewey is not more costly than in the reverse direction. Sugar Creek is particularly concerned with the rates to the intermediate points, as there is no movement of cement from Sugar Creek to Dewey.

The commission should find that the rate from Sugar Creek to Dewey is, and for the future will be unreasonable and unduly prejudicial to the extent that it exceeds or may exceed the rate from Dewey to Sugar Creek.

Sugar Creek complains of the rate of 11 cents from that point to Forty-first and State Line streets, which will hereinafter be referred to as Forty-first street, a point of delivery on the Missouri & Kansas, an electric line, in that part of Kansas City known as Rosedale. Team track delivery is desirable at Forty-first street. The Missouri & Kansas extends from Olathe to Forty-first street and connects with the Frisco at Olathe and Lenexa, Mo. Rosedale, on the Missouri & Kansas, is not shown as part of the Kansas City switching district, but is named in the Frisco's switching tariff. There is no connection between the Missouri & Kansas and any steam road at Rosedale or in Kansas City. The rate from the gas belt to Forty-first street is 11 cents, which is also the rate from Sugar Creek to that point. Sugar Creek points out that the commission approved a rate of 4.5 cents from Sugar Creek to points in the Kansas City switching district in Lehigh Portland Cement Co. vs. Director-General, 77 I. C. C. 146.

Traffic from Sugar Creek to Forty-first street is routed over the Santa Fe to Olathe and thence Frisco to Lenexa, at which point it is delivered to the Missouri & Kansas. The distance over this route, which is the rate making route as well as the operating route, is 63 miles. The haul is within Scale III territory and the Scale III rate for that distance is 10.5 cents, which is .5 cents less than the present rate. Sugar Creek points out that the rate from Dewey to Forty-first street for a haul slightly less than 194 miles is 11 cents. Also that the scale rates which apply from Hannibal and St. Louis to Kansas City cover deliveries by the Missouri & Kansas at Forty-first street. The routing of traffic from Hannibal and St. Louis to Forty-first street is through Kansas City and Lenexa.

The commission should find that the rate on cement, in carloads, from Sugar Creek to Forty-first street is and for the future will be unreasonable and unduly prejudicial to the extent that it exceeds or may exceed the scale rate for the distance from and to those points. The defendants participating in the traffic should be required to establish a joint rate accordingly.

—*Traffic World.*

Decision in Alabama Lime Case

THE Alabama Public Service Commission, under date of July 12, rendered its decision in the General Lime case involving the carload and less carload rates on lime, common, hydrated, quick or slaked between all points within the state of Alabama.

The commission in this case has prescribed a joint line scale for application between all points within the state, as well as a single line scale. One scale has been prescribed for application on lime, minimum weight 30,000 lb., and a lower scale on lime, minimum weight 50,000 lb., the scale on the higher minimum being approximately 80% of the scale adopted on the lower minimum of 30,000 lb.

In this connection, the state commission has also ordered the grouping of all lime kilns in the state of Alabama, with the exception of Cumberland and Ft. Payne, to the Birmingham district, and the application of a common rate from all points of production to Birmingham. This basis was advocated by both the producers and the receivers, as it enables all the producers to reach the large Birmingham market on a rate parity and enables all the receivers to have a wide field in which to purchase their lime on a rate equality.

The commission has also ordered that it would be proper to group all the lime kilns for rating purposes to Anniston, Alabama City, Attalla, Gadsden, Childersburg, Albany, Decatur, Jasper, Montgomery, Selma, Talladega, Tuscaloosa and Holt and observe a common rate from all points of production to these common markets instead of the rigid application of the mileage scale from each point of production.

A retention of the existing less carload commodity rates was ordered by the commission until a general revision of the class rate structure is accomplished. After the class rates have been revised, it is probable the cancellation of the less carload commodity rates will later be brought up for hearing.

The decision is the first one which has been rendered by any state commission, including the Interstate Commerce Commission, on lime rates generally between points in Southern territory and is considered very important in view of the fact that it will doubtless furnish the basis for a revision of all lime rates between points in Southern territory.

The state commission has not named a specific date for the revised rates to become effective for the reason that the intrastate revision is to be held up until the interstate rates have been revised so that both adjustments may be made effective at the same time.

Mining and Quarrying Compared by an Engineer Familiar with Both Operations

Part 4—Some Typical Limestone Mining Operations

By J. R. Thoenen, Member A. I. M. E.

HAVING in previous articles discussed various theoretical methods of recovering limestone from below the surface, let us now see how they are applied to actual operations.

I will in this article attempt to describe in some detail operations where limestone and similar products are mined, covering both favorable and adverse natural conditions and the method used in overcoming each problem.

Before proceeding let me take this opportunity of thanking the operating officials in the various plants visited for their hearty co-operation in collecting the data which alone make these articles of value.

While some operators have expressed their willingness that descriptions of their plants and methods be published under their names others have desired that their names be withheld. I have therefore decided to describe the various plants without naming the owners nor giving locations. In this way I feel more detailed information may be given and better comparison of methods be reached without injury to any interested parties.

Costs at various plants naturally cannot be published on a dollars and cents basis. I will, however, attempt to show at some plants the relation between the various component costs to the total costs on a percentage basis.

For this purpose cost data have been compiled on the following basis:

Consider total cost per ton 100% subdivided as shown on the opposite page:

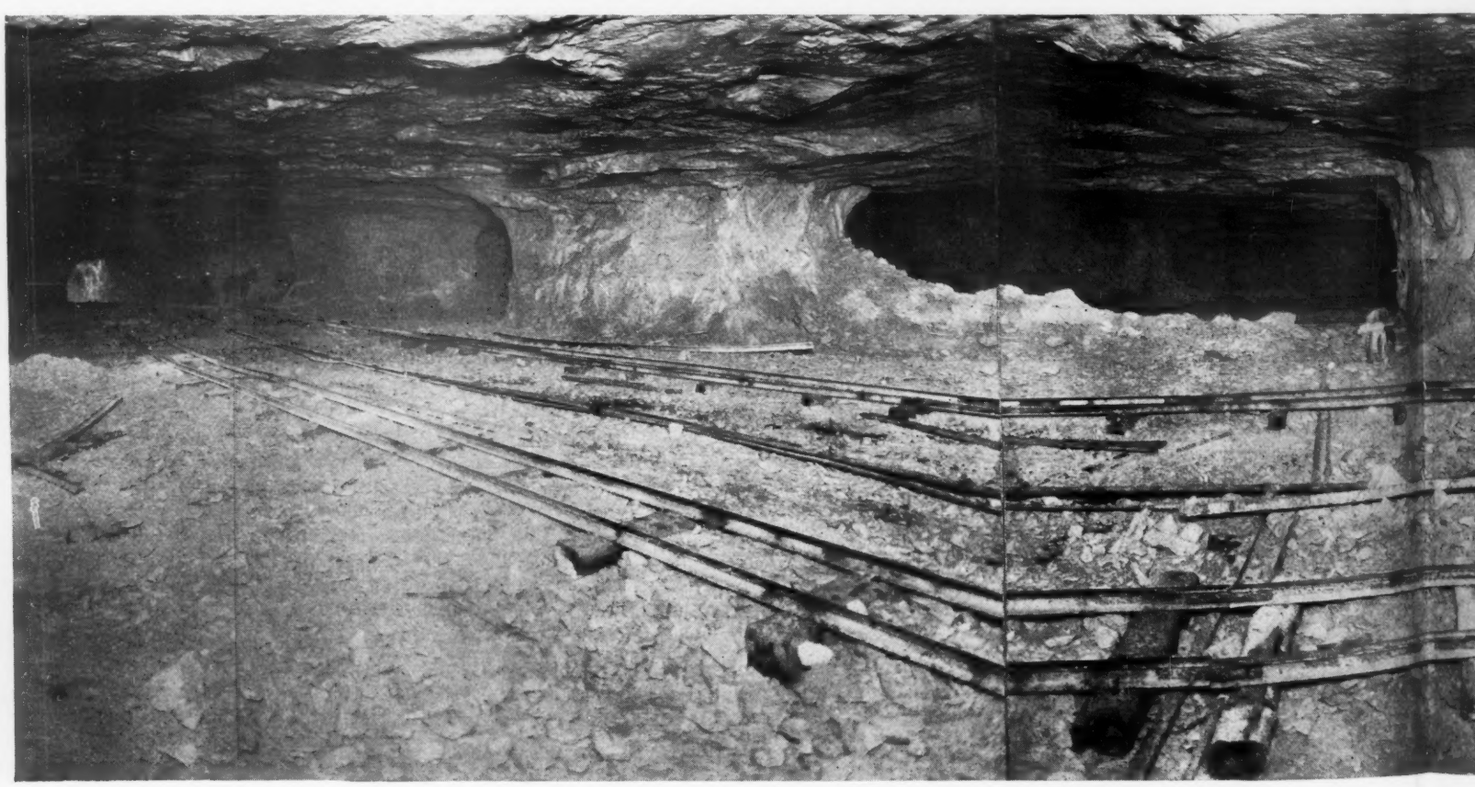
Plant (A)—Mining for Kiln Stone

Limestone is mined for the manufacture of lime at this plant. For this reason a particularly clean stone is of paramount importance. In this particular case the stone has a tendency to crumble considerably in the kilns and it was therefore desirable that a product of uniformly, fairly large size be produced or in other words that the method of recovery be such as to make a minimum of fine stone.

Capping the good stone is a stratum of dolomite at the present time of no commercial value to the operators and in fact a decided detriment when mixed with the good limestone. This dolomite is approximately 15 ft. thick and badly broken up due to weathering. Cracks and fissures occur both vertically and horizontally. On top of the dolomite and filling many of the cracks and fissures is a residual clay varying in thickness from a 1 to 15 ft.

When previously operated as an open pit the clay surface had been removed by steam shovel where possible and by hand where the steam shovel could not operate. No water was available for hydraulic operations.

The dolomite was then drilled with well drills and shot down with the good stone.



A panorama of the tunnel entrances to the limestone mine of the Peerless White Lime Co. at Ste. Genevieve

Outline of Costs Based on Percentages of Total Cost

1.	Stripping or Development	Labor, Supplies, etc.	Total.....%
2.	Explosives	Dynamite, Blasting Supplies, Freight, etc.	Total.....%
3.	Labor	All payroll expense in mine and plant, except stripping, including workmen's liability insurance	Total.....%
4.	Supplies	All material entering into plant maintenance and equipment of all kinds, including office supplies, stable, and all other plant purchases, including fgt.	Total.....%
5.	Fuel or Power	Including electricity, fuel, coal, coke, and fgt.	Total.....%
6.	Depreciation	Including royalty, depreciation, depletion, obsolescence, and amortization	Total.....%
7.	General Expense	All salaries and expenses of general administration, selling expense, interest on borrowed money of all kinds, insurance, taxes, and reserves of all kinds	Total.....%

Superintendents, foremen, or clerks, and office expenses at plant NOT included as these items are under Labor and Supplies.

This caused a bad mixture in the quarry and the dolomite had to be picked out by the muckers or loaders. Because of the necessity for a sized clean stone a steam shovel was not practicable in the quarry.

The commercial stone lies practically flat or horizontal with a rough parting on the bottom. The strata afford a total of 60 ft. of good stone, but about 15 ft. at the top had to be left to support the dolomite and clay overburden. The rock is limestone of medium hardness.

The method of mining used is a room and pillar system (Fig. 7 in the previous article) combining a breast and back stope over shrinkage.

In this particular case both rib and square pillars are used. The ribs run 15 ft. in width by 100 ft. in length. The square pillars vary from 20 to 30 ft. as conditions require. Since my visit, I am informed that the ribs have been discontinued and pillars only are left, thus accomplishing the same results and saving considerable rock without mining it later.

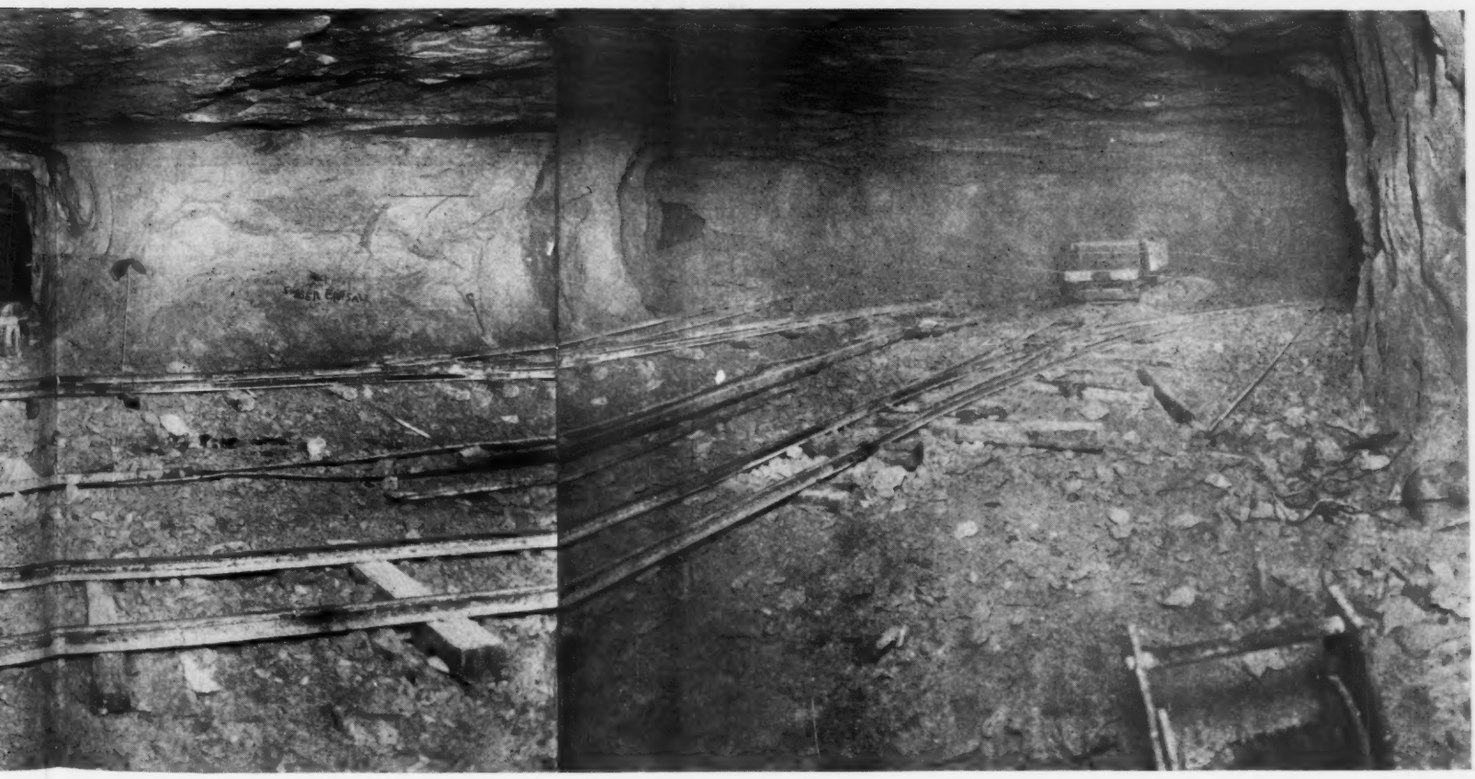
Rooms are carried 40 ft. wide and approximately 45 ft. high.

The procedure is to carry each room first as a tunnel 40 ft. wide and 12 ft. high for a distance of 200 or 300 ft. Then the innermost end of the tunnel is raised over its entire width to the final height of the room or 45 ft.

Broken stone from the original tunnel is removed as broken, but that from the raise is left in place and the drills work on top of the pile. Thus no scaffolds are needed to reach the ground to be drilled. As the space occupied by a cubic yard of solid stone is less than that occupied by the same stone after breaking, it is obvious that a part of this accumulated stone from the raise can be removed. This quantity varies in different materials from 30 to 45%.

After reaching the desired length in the raise the drills are turned to face the entrance and horizontal holes are drilled in the hanging back. This, on breaking, falls on the already broken stone and is partly removed as before. When the original portal of the room is reached drilling stops and the room is left practically full of broken stone to be removed by the muckers. Thus a reserve is created approximately 40% of the original solid stone in the room.

In the initial breast stope or tunnel a center or V-cut is drilled using eight 12-ft. holes. On each side of this are four vertical rows of three holes ranging from 8 to 10 ft. long.

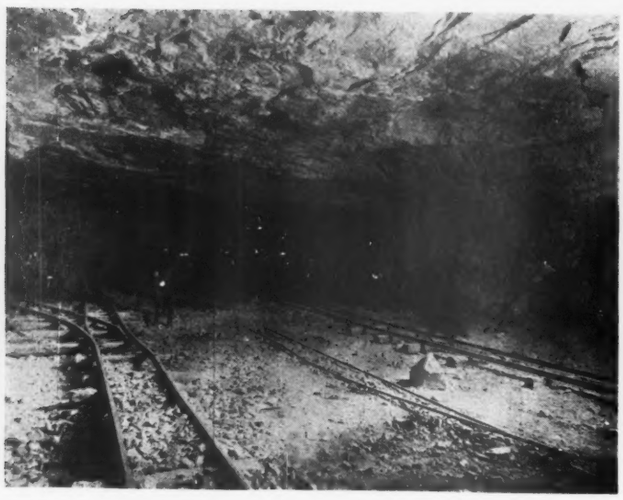


Ste. Genevieve, Mo.—or rather it is a view of the tunnel entrances at three angles taken from the same location

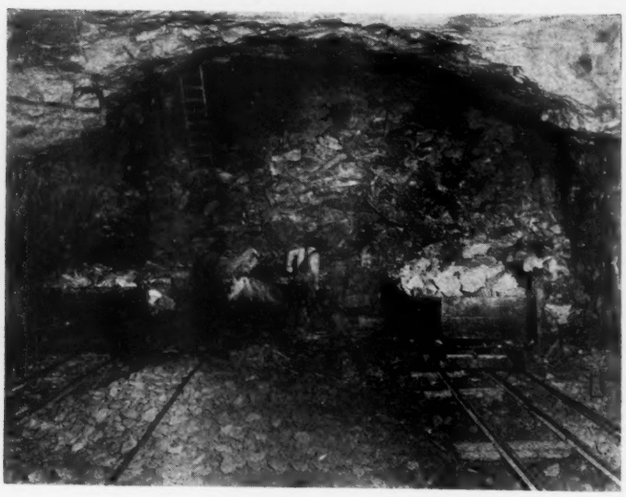
The Limestone Mine of the Peerless White Lime Co., Ste. Genevieve, Mo.

Tunnel view showing drill set-up

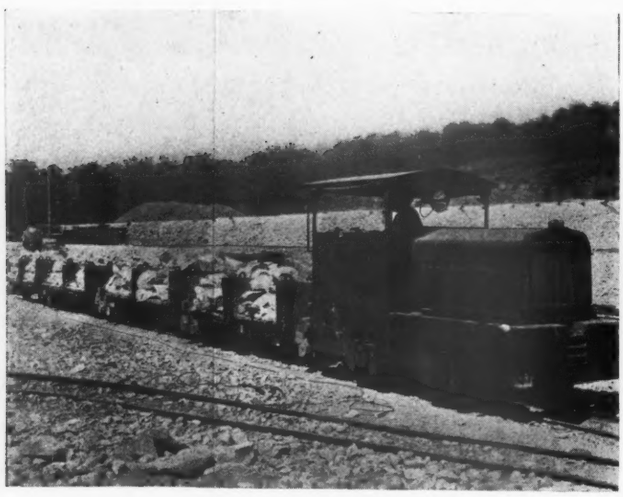
Entrance to the mine from the inside



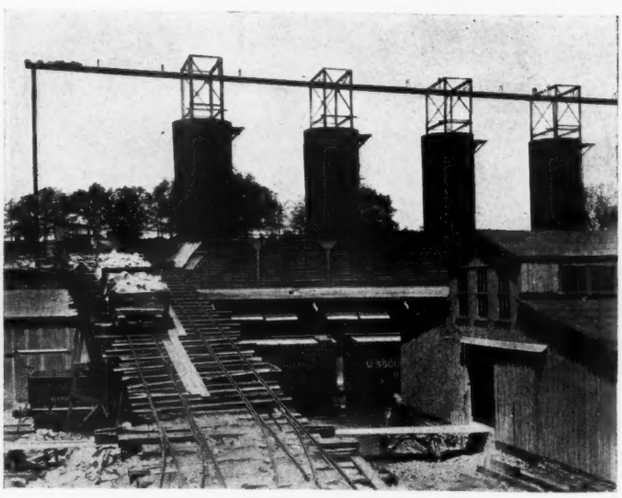
View in tunnel showing relative size



Stoping from the rear toward the entrance



Gasoline locomotives take trains to lime plant



The lime plant showing incline to crusher

The raise is driven similarly to the breast stope except that the holes are drilled upward instead of horizontal.

The back is carried by drilling one hole in the center of the room and one along each pillar. These holes are drilled 16 ft. long and carry a burden of 5 ft.

All drilling is done by hammer type air drills mounted on single jack mining columns. One-inch quarter-octagon steel is used with four point bits.

The explosive used is a slow acting gelatin rated at 25%. Firing is done by fuse and caps.

The production per man in the mine averages eight tons per day.

With total cost per ton of stone at 100% costs are as follows:

Stripping	0.0%
Explosives	6.9%
Labor	62.4%
Supplies	1.5%
Fuel	8.5%
Depreciation	6.0%
General Expense	14.7%
	100.0%

At this plant there is no crushing plant for mine rock, but that material too small for use in the kilns is dried and ground in tube mills for the chemical trade.

good lime rock is left between the floor of the quarry and the back of the mine. This will be recovered later together with rock now in mine pillars by open-pit methods as the cover rock is removed and the open-pit operations advance. An ideal method here would of course be to remove the upper rock by open pit and follow with a second open pit bench on the good stone, but tonnage requirements necessitate mining in advance.

Capping the poorer grade of limestone is from 1 to 12 ft. of loam. This is removed by hydraulicking. Water is pumped from a nearby stream with a 975-gal. per minute

An Indiana limestone quarry and mine operation—mine entrance shown near the center of the view between the quarry openings

As noted above, all loading is done by hand. Cars are removable wooden boxes placed on trucks. Boxes are hoisted and dumped into the kilns.

Mules are used for collecting trains and gasoline locomotives for haulage from mine to kilns. Approximately 3.6 tons of rock are produced per pound of explosive. In this connection it should be borne in mind that most of the work now is in preliminary tunneling and a better ratio is expected from the stoping operation.

Each foot of hole drilled in the tunnels or breast stopes produces 0.9 ton of stone, while in the back stope each foot breaks from 4 to 6 tons, depending on how far the rock breaks beyond the end of the holes.

Plant (B)—Mining Under a Quarry Operation

At this plant limestone is mined for the manufacture of lime as in plant (A), therefore size is a requirement as well as quality.

The stone mined lies in a flat stratum approximately 54 ft. thick. Only the lower 38 ft. is mined. This has a clean parting both top and bottom, affording easy separation from roof and floor.

The good stone is capped by from 130 to 160 ft. of limestone unsuited for lime burning but excellent for road purposes. This stone is being recovered by open-pit quarry operations which at one point are vertically above the mine operations. Sixteen feet of

duplex plunger pump. The water is carried through an 8-in. pipe reduced to 1½-in. at the nozzle with 175 lb. pressure. Dirt occurs in crevices at the surface and this is removed by hand.

The room and pillar method of mining is used. The particular method of breaking being similar to that illustrated in Fig. 5 in the preceding article.

Rooms are carried 50 ft. wide and pillars 30 ft. in diameter.

The method of breaking ground is a combination of breast and overhead stoping followed by a second overhead stope or bench. The original rooms are carried 12 ft. high by breast stoping, while the next upper 4-ft. stratum is drilled from the same drill set

up and blasted at the same time. This 4-ft. stratum is drilled and blasted in this manner in order to make room to handle the 20-ft. steel used in drilling the upper holes for blasting down the upper 22 ft. of stone.

All drilling is done by hammer type air drills. The drills in the breast of tunnels work on 12 ft. columns, while those bringing down the back are mounted on 16-ft. columns with the men working on scaffolds. A special bit is used on the long holes.

All loading is done by hand into two-ton cars hauled by mules.

Approximately 3 tons of rock are produced per pound of explosive and 1½ tons per foot of hole drilled. The tonnage per man per day averages eight.

An unusual operation at this plant is the installation of a rotary kiln for burning mine spalls underground. Spalls with this method will be hauled direct to the kiln and not brought to surface for burning.

Based on 100% for total cost per ton of stone costs are as follows:

Stripping	0.0%
Explosives	10.0%
Labor	67.7%
Supplies	4.4%
Power	8.2%
Depreciation	1.8%
General Expense	7.9%
	100.0%

(To be continued)

Uses for Special Cements—Railway Trucks Manufactured from Concrete

By Consul General F. T. F. Dumont

Frankfort a/M, Germany

RECENT experiments with a composition manufactured in this district designated as "eisenbeton" or "iron concrete" have shown that it is possible to employ it successfully in the construction of the floors of railway freight cars which hitherto have been made of iron.

The iron and wood at present in use require the railway administration to expend several million marks annually in repairs, and it is believed that in "eisenbeton" a satisfactory substitute has been found for iron.

According to the inventor of this particular concrete, Dr. Kleinlogel, of the Technical High School at Darmstadt, the first railway truck made of "Eisenbeton" was built in 1919, at his suggestion, by a railway car manufacturer and a Portland cement concern in Heidelberg. This truck was tested in the freight yards of the railway to ascertain its capacity to withstand concussion at a speed of 27 kilometers. It is stated that the "shifting" tests were entirely satisfactory, and that after five years of service this test truck still remains in perfect condition.

It is understood that the Federal railway authorities are much interested and it is expected that trucks manufactured of concrete will be shortly used in considerable numbers.

A company for their manufacture has been formed at Darmstadt. The new type of car weighs 20 tons. In appearance it is much the same as an ordinary iron truck. The cost of manufacture is said to be much less than for iron, and while it is admitted that the weight of "Eisenbeton" is greater, this fact is of no great importance in comparison with the advantage it has over iron by reason of its non-rusting qualities.

Another view of Indiana quarry operation showing crushing plant in the foreground

Diatomaceous Earth for Making Concrete Non-Porous

DIATOMACEOUS earth has been tried on the West coast for making concrete non-porous and consequently waterproof. In making a concrete barge for use in San Francisco harbor, 5% of this earth was added to the mix.

Barytes and Barium Products in 1923

THERE was a notable increase in the output of barytes in the United States in 1923, according to the Department of the Interior, as shown by statistics compiled by the Geological Survey working in co-operation with the geological surveys of the producing states, and of lithopone and the various barium chemicals, and there was a resultant decrease in the imports of these commodities. On the other hand, the production of ground barytes fell off considerably and the imports were larger.

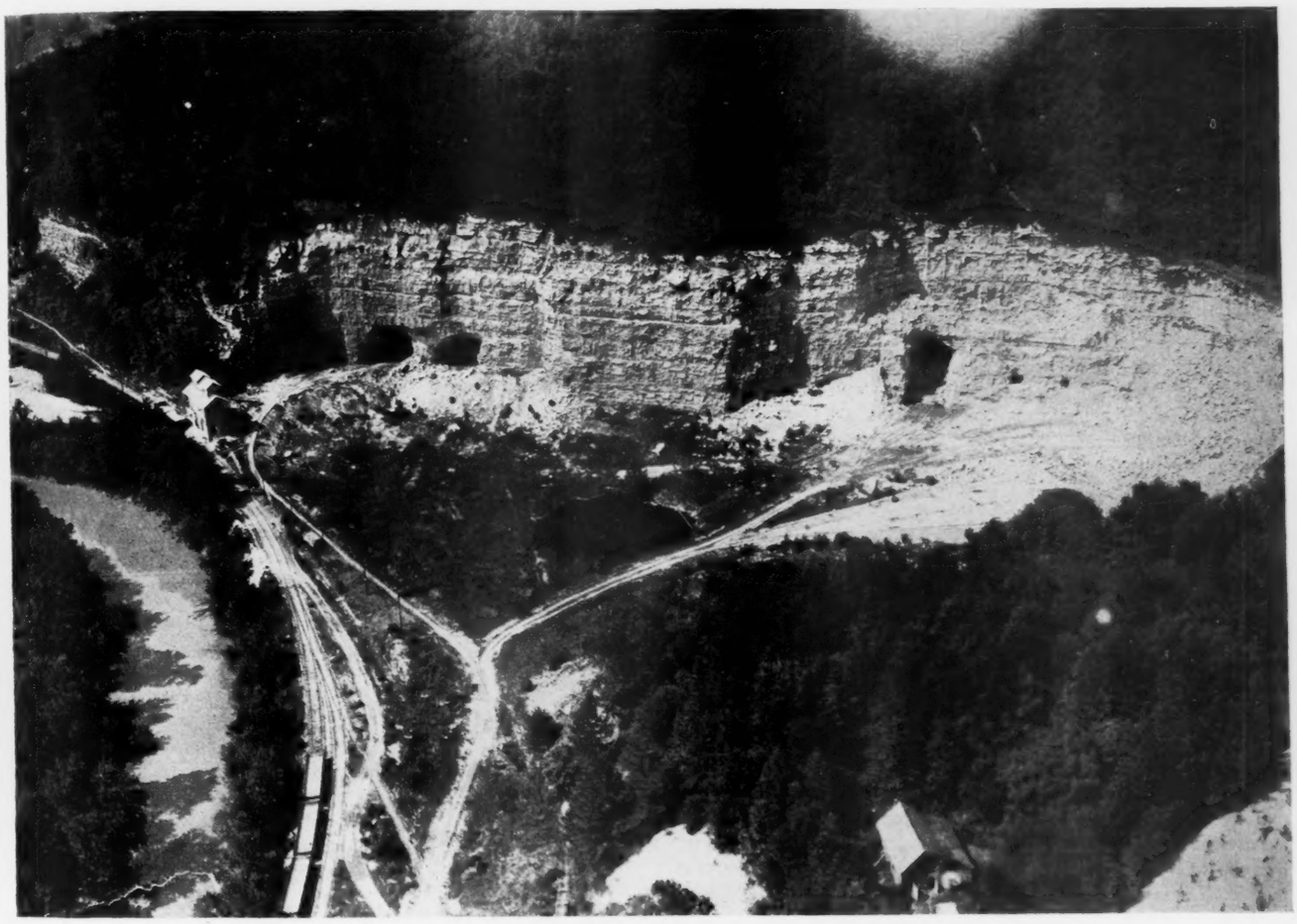
The crude barytes shipped from mines in the United States in 1923 amounted to 214,183 short tons, valued at $1,664,156, an increase of 38% in quantity and 48% in value over the output in 1922. This output was exceeded only in 1916 and 1920. Georgia shipped 39%, Missouri 38% and Tennessee 16% of the total.

Imports of crude barytes in 1923 amounted to 15,045 short tons, worth $93,721 at port of shipment, a decrease of 35% in quantity. A small quantity of barytes was exported to Canada.

The manufacturers of barium products used 210,587 short tons of domestic and imported crude barytes in 1923 in the production of ground barytes, lithopone and barium chemicals. The shipments of ground barytes were 39,605 short tons, valued at $895,095, a decrease of 14% in quantity from 1922. The sales of lithopone were 98,199 short tons, worth $11,608,443, an increase of 18% in quantity. Manufacturers of barium chemicals report the shipment of 16,803 short tons, worth $1,215,596, a quantity 21% larger than in 1922. These chemicals consisted of 6362 tons of barium carbonate, 3301 tons of barium chloride, 6761 tons of barium sulphate and smaller quantities of barium hydroxide and sulphide.

The imports of ground barytes were 6022 short tons, valued at $88,741, an increase in quantity of 28%. There was a slight increase in the imports of natural barium carbonate (ground witherite), which were 1557 tons, valued at $41,823. The imports of lithopone were 10,440 tons, worth $776,383, a decrease in quantity and particularly in value. There was a decrease of 55% in the total imports of the barium chemicals, binoxide, sulphate, chloride and artificial barium carbonate. The figures showing the imports of barium hydroxide and nitrate are not available for comparison for dates prior to September 22, 1922, but 181 tons of barium hydroxide, valued at $16,872, and 511 tons of barium nitrate, worth $59,766, were imported in 1923.

Exports of lithopone in 1923 amounted to 1485 short tons, valued at $176,624, about 8% less in quantity than in 1922.



Mine entrances through face of quarry in Indiana limestone mining operation

Quarry Accidents

TECHNICAL PAPER 353, "Quarry Accidents in the United States during the Calendar Year 1922," by William W. Adams, statistician, has just been issued by the Department of the Interior, through the Bureau of Mines. The paper contains detailed statistics regarding accidents classified by cement rock, granite, limestone, marble, sandstone and bluestone, slate, and trap rock quarries. A series of tables gives data as to accidents occurring from falls or slides of rock, explosives, haulage, machinery, and other causes. A compilation of the accident rate in small quarries and large quarries is made and the accident hazard of quarries and coal and metal mines is comparative. A special table gives the result of a study of accident rates based on hours of exposure.

Technical Paper 353 may be obtained from the Department of the Interior, Bureau of Mines, Washington, D. C.

Directorate of New England Portland Cement and Lime Company

Alfred S. Black, President, Obtains Group of Leading New England Contractors and Business Men—Soon Begins Work on Plant

THE first meeting of the full board of directors of the new England Portland Cement and Lime Co., the new corporation organized through the efforts of Albert S. Black to operate in Rockland and in Thomaston, Maine, was held July 25 at the rooms of the Boston Athletic Association, the list of the directors being made public after the meeting.

They are as follows: James J. Scully, Cambridge, Mass., president, the Scully Co., contractors, vice-president, Building Trades Employers' Association of Greater Boston.

C. A. Dodge, Cambridge, Mass., president, C. A. Dodge Co., contractors.

James H. McNamara, Eagle Rock, Va., president, Eagle Rock Lime Co.

Richard P. Keefe, Worcester, Mass., Keefe Bros., contractors, treasurer Associated Contractors of Massachusetts.

Alfred S. Black, Boston, president.

George W. Allison, Boston, construction manager, Simpson Bros. Corp., concrete engineers, contractors.

William P. Shine, Cambridge, Mass., treasurer, Boston Structural Steel Co., Cambridge, Mass.; president, Cambridge Chamber of Commerce.

Fred V. Murtfeldt, Boston, W. A. Murtfeldt Co., contractors; president, Master Sheet Metal and Roofers' Association.

Richard W. Saunders, New York City, comptroller, Famous Players-Lasky Corp.; formerly cashier National Bank of Commerce, New York.

Fred C. Black, Thomaston, president, Black & Gay, Canners, Inc.

Obadiah Gardner, Rockland, ex-United States senator; former member International Boundary Commission.

S. T. Kimball, Rockland, attorney-at-law.

Walter E. Bowne, Boston, treasurer; formerly vice-president and cashier, Boston National bank.

Only New England Cement Plant

Alfred S. Black, the president of this new industrial development, has secured a group of leading New England contractors and business men as directors of the company, and Maine is now to be the home of the only portland cement plant in the New England states.

Organization and plans for the company have been going on for some time.

James H. McNamara, president of the Eagle Rock Lime Co., a man well known in the city of Rockland, a director of this new company, made the trip from Virginia to attend the meeting on Friday. Mr. McNamara spoke of the world's greatest engineering feats built with portland cement and told of the benefits that will accrue by the establishment of this industry, not only for Maine alone but for entire New England.

George W. Allison spoke of the necessity for a cement plant in New England. Mr. Allison assisted in building the Edison cement plant and stated that over 137,000,000 bbl. of cement were used in the United States in 1923 and that, although New England uses nearly 8,000,000 bbl. of portland cement each year, it all comes from other sections of the country and New England is the only section of the entire United States that has no cement plant.

Alfred S. Black gave a brief outline of the history of the property and the development by diamond core drilling under the supervision of engineers of national prominence. The preliminary development of this property has been stated by authorities to be the most thorough and important known in the lime or cement industry.

The United States government loaned the company a film, "Story of Portland Cement," showing the process of manufacture from the quarry to the consumer, which was shown at the meeting and proved to be of great interest to the directors, many of whom use this product in their business.

The directors elected a finance committee and the president appointed a committee on plant construction.

John C. Schaffer, president of the Schaffer Engineering Co., Pittsburgh, Penn., was the guest at this meeting. Mr. Schaffer reported on the Rockland and Thomaston properties and stated that with the raw material that was available, the tremendous demand for the product in New England, this company had the greatest industrial opportunity in the United States.

Soon Begin Work on Plant

Construction of the plant is to start as soon as possible. The company is contemplating constructing this plant in units, the first unit to be a lime unit with modern handling devices with an annual capacity of 500,000 bbl. of lime. The second unit to be a cement unit of 2000 bbl. daily capacity, or 600,000 bbl. of cement annually.

Value of Industry to Maine

The value of this industry to the state of Maine can well be considered when we realize the various factors that enter into the manufacture of this important product. Textile manufacturers deliver 17,000 miles of cloth, 30 in. in width, to the cement industry each year for new cement bags. This industry is a large consumer of power and the fourth largest consumer of coal. Capital aggregating $300,000,000 is invested in the industry and 40,000 men are employed.

The credit for this industry coming to Maine is due entirely to the untiring efforts of Alfred S. Black, who realized through his connection with Eugene Meyer, Jr., of New York, who spent over $115,000 for preliminary development of the property, that the industrial opportunity for New England was in his own home state.

By his efforts he was able to secure the co-operation of a number of the most prominent contractors and business men to perfect the organization, and today the state of Maine is on the threshold of tremendous industrial activity.—*Portland (Maine) Press-Herald.*

New Arizona Gypsum Plant

A NEW industry, whose scope and importance will increase as new uses for its product are discovered and developed for the building trades, has been established in Tucson, Ariz., by the Tucson Gypsum Products Co.

The newly formed company, which has established a $20,000 plant in the rear of the assay office of E. A. Jacobs, on South Main street, was organized by Mr. Jacobs, who is president of the company and by Manuel G. Flores, a director. James R. Dunseath, who entered the company after its organization, is secretary and treasurer.

The purpose of the company is to supply the local building trades with a plaster product secured from a deposit seven miles from Tucson, near the Catalina mountains, which was obtained by the company from the state under a lease. The property contains 40 acres, and the depth of the gypsum has not been penetrated by its operators.

While the company was formed last January, its existence has not been generally known, as most of its operations have been of an experimental nature. These experiments, conducted by Mr. Jacobs, have proved the commercial value of the product, in which the desirable quality of timesetting has been perfected by Mr. Jacobs.

The present plant, which includes a grinder for the raw product and a calciner, is capable of turning out 20 tons of the finished product a day. The capacity can be increased by working different shifts when the demand for the plaster commodities warrants an increase.

While the company is capitalized for $50,000, Mr. Dunseath stated that capital stock for this amount would probably never be issued, as it is the intention of the promoters to improve their plant from the profits accruing.

The plaster is being used entirely for finishing the walls of the auditorium of Tucson's new high school.—*Tucson (Ariz.) Citizen.*

Governor Groesbeck of Michigan Tells What a Smart Cement Manufacturer He Is

THE *Detroit (Mich.) News* of July 27 quotes Governor Alex J. Groesbeck as follows:

"Michigan uses, and will use, for some time, about 1,800,000 barrels of cement yearly," Gov. Groesbeck began. "Until a short time ago, all this cement was purchased from private firms, whose prices were set by a Buffalo cement firm. This firm could produce cement, as a by-production, much cheaper than any other firm could, and could, therefore, go into Michigan and drive out of business every Michigan cement plant. For their own protection, therefore, the Michigan firms had to set their prices according to the dictates of the Buffalo plant. There could be no such thing as competition prices through fear of reprisals that would mean complete ruin.

"That situation was bad enough, but there is another bad thing about it. Just at the height of the road-building season, when the State needed cement promptly delivered at contract prices, there developed every year a cement shortage. But while the State had to suspend operations, the cement companies could make deliveries to their private companies, but at a higher price than the state contract permitted them.

Enters Business

"The only way to break this up, and to break up combinations of contractors, was for the State to go into the road-building business. It is an old story now of how the State got road-building machinery to build a part of the roads on each season's program, and how it has built up an organization that is of vast use to the citizens in saving money and setting high standards for private contractors. That helped. We were building more and better roads cheaper, with our own organization, and machinery and prison labor.

"But the heart of the question was to be able to supply at least a portion of our own cement. To make cement there must be a supply of limestone, coupled with a supply of shale or clay. The State geologist was set to work to find a limestone bed and a shale or clay supply. Near Charlevoix, he found a bed of limestone; a huge one, and underneath the limestone was a strata of shale. It is probably the best piece of property for cement-making purposes in this country. The State took an option on it, drilled to make sure of the huge supply, and then bought it for about $9,000.

"I am positive that today, if it were for sale, private individuals would be willing to pay at least $200,000; but it's there, for the use of the state of Michigan, and nobody else.

"The next problem was to get a cement plant. I ascertained that for a modern cement plant, capable of turning out 500,000 bbls. annually, the cost would be about $1,000,000. But it had been noised about that the State might be in the market for a cement plant, and one day representatives of the plant at Chelsea came to me and showed me that an inventory of their plant estimated its value at $950,000. They would sell cheap, they said, to settle an involved estate.

"I asked how much they wanted and they said $700,000. I told them that was out of the question, and there was no use discussing the matter further. Some time later, as the importance of the cement plant at Jackson prison became more and more apparent, they renewed their solicitations to me that the state purchase it, and said they would sell for $600,000 cash.

"My answer was I would not pay cash for it under any circumstances, and certainly would not consider any such price as $600,000.

"At last I told them I would consider an offer of $500,000 with an annual rental, which would be applied on the purchase price if we decided to buy it. Finally we came to terms, a five-year contract at $75,000 a year, with the privilege of buying it for $500,000 any time within a three-year period, and the rental that might have been paid to be deducted from the $500,000.

Pay for Itself

"We will produce annually in that cement plant between 400,000 and 500,000 bbls. of the 1,800,000 used by the State. I will state positively the plant will pay for itself in two years, out of its earnings.

"I won't state what the figures have so far shown, as it would not be good policy just now to let the private cement companies see our cards, but the generality that it is one of the best investments the State could possibly make is certain and definite.

"And, as a result of the enterprise the State has shown in this matter, the private cement manufacturers and contractors are treating us much better than ever before."

Progress on New Clinchfield Cement Plant

COMPLETE electrical equipment of a new cement mill at Coreen, Ga., is planned by the Clinchfield Portland Cement Corporation of Kingsport, Tenn. A contract was recently closed by this concern with the General Electric Co. for two 1000-kw. turbine generators, a 16-panel switchboard, over 60 induction motors of various sizes and six super-synchronous motors, four rated 500 hp. and two 300 hp.

In the plant layout the induction motors specified are of such capacity that they will operate fully loaded and, by including a large amount of synchronous apparatus, it is expected that the entire plant will operate at or very near unity power-factor at all times.

French Are Optimistic Over Future of "Ciment-Fondu"

AN INCREASING interest in bauxite developments is shown by French manufacturers, because of their confidence that fused cement, "Ciment fondu," will soon be produced at a price allowing its wide industrial use. In making this product, bauxite is necessary, and its production will rapidly increase if, as aluminum interests believe, its manufacture by the rotary furnace can be perfected—an accomplishment which would greatly reduce the price—and put it on a basis with the current brands of cement. The new product, it is claimed, has a wide field of utility, because it remains unchanged in the presence of waters charged with acids and magnesia. A number of cement interests, therefore, have been added to the list of those anxious to acquire bauxite deposits, including the Societe Pavin de LaFarge, which has recently bought the bauxite reserves, Loupian, from an owner in the Herault district. The Societe d'Electro-Chimie, d'Electro-Metallurgie et des Acieries Electriques d'Ugine, which manufactures fused cement at Moutiers, is seeking new bauxite resources for this branch of its activities.—*U. S. Commercial Reports.*

Yosemite Cement Company to Make Agricultural Limestone

IN ADDITION to the manufacture of portland cement at the plant of the Yosemite Portland Cement Co., Engineer Steinmets states that he will produce a by-product which will be of great benefit to the Merced county farmers.

This by-product is agricultural limestone. The ground limestone which will be left from the crushing operation at the quarry will be much finer and therefore better than most of the product sold. Owing to its location and the fact that it is a by-product the local company will be able to supply the Merced county farmers this fertilizer at a price much less than they are paying at the present time for the imported product.

Special machinery will be installed at the quarry for securing the limestone product and it is estimated that by the saving the Merced county farmers will be saved thousands of dollars on their fertilizer.

Speaking of experiments made in Stanislaus county the *Modesto Herald* says:

Lime and sulphur combination fertilizers, which have been tested by officials of the county extension service, are in the lead of other fertilizers for alfalfa. The checks using hydrated lime are not holding up as well as the checks using limestone and sulphur.—*Merced (Calif.) Star.*

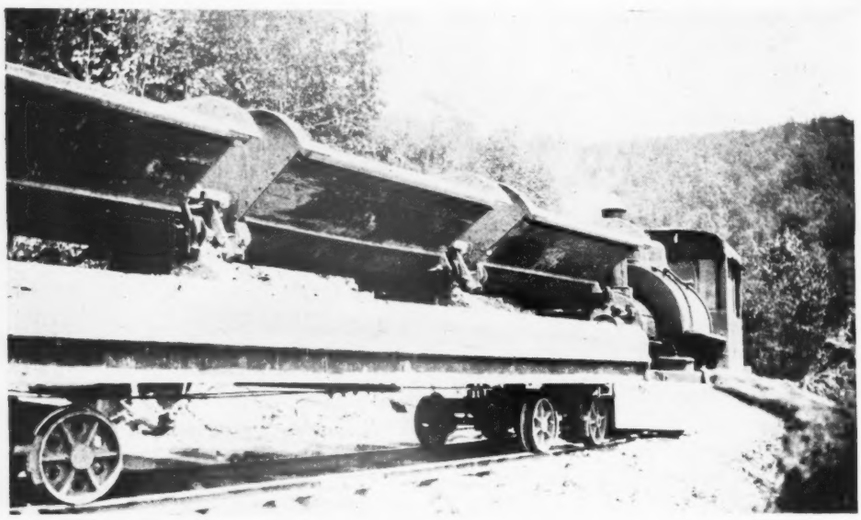
Hints and Helps for Superintendents

Disposal of Quarry Stripping

By D. J. KELLY
Superintendent, Greer Limestone Co.,
Greer, W. Va.

HEREWITH is a kodak view of the equipment used on our stripping operation.

Please notice the plow attached to the locomotive. This is a labor saving devise used to keep the dumping track free of dirt. The cars are of war-time trucks and Koppel beds.

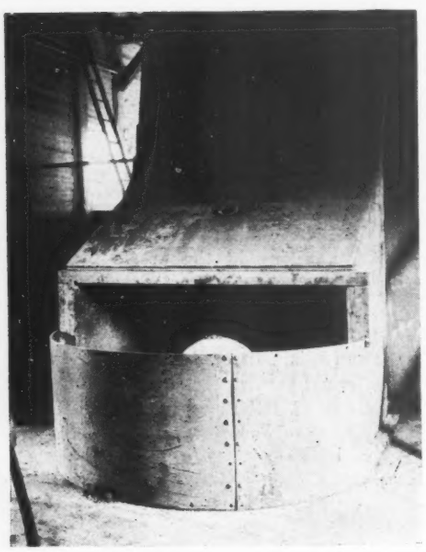


Special car and plow for handling quarry stripping

Use for Old Boilers

SEVERAL uses for old boilers have already been shown in these pages, such as making air receivers and water tanks of them. The illustration shows a water tank made from a small boiler which was mounted on wheels so that it could be drawn by horses. This is in use at one of the quarries of the Kansas City Quarries Co. For the limited amount of water that is needed at the plant it is considered cheaper to haul it in a tank wagon than to pump it.

Water tank made from old boiler



This is one of the ways Henry Ford provides safety and cleanliness in his glass sand plant

Another Crusher Guard

ALTHOUGH ROCK PRODUCTS has published in these columns several different methods of providing safety and cleanliness around gyratory crushers, it wants to pass on to its readers the method used at the Ford Motor Co.'s glass-sand plant at Cabot, Penn.

The crusher, where it is employed, is a secondary and is located below the primary breaker, the stone entering it by gravity. As may be seen in the illustration, the chute extends to the crusher, forming a box which encloses the back side. The box is lined with ¼-in. sheet steel. The circular guard in front is 2 ft. high and is bolted at each end, top and bottom, to the chute box.

Babbitting

By W. DOLL
Superintendent, Sheldon Slate Products Co.,
Granville, N. Y.

BABBITTING bearnigs is a job which every quarry operator has to contend with and, almost invariably, the blacksmith or millwright does the work—sometimes successfully and sometimes not so successfully.

Most of these men are familiar with the usual precautions of heating the mandrel and the bearing to be poured and the smoked pine stick. They can pour some good looking bearings and in many cases bearings which work successfully. However, there are times when the best looking pours do not give satisfactory bearings.

This is especially true when two bearings—such as the main shaft bearings on a jaw crusher—have to be poured. In many cases after such a job is done, and the bearings put to work without first boring them true, it is usually a long trying task breaking them in for continuous operation. Such bearings have no adjustment and very few operators have the time or equipment for boring them. Consequently the babbitt pour must be true.

The usual method is to lay the mandrel in both bearings, leveling, blocking under for thickness of bearings and sideways to prevent moving when the pour is being made. After this is done the clay is applied to prevent leakage of babbitt metal and the boxes poured. This is all right as far as it goes but in my experience it does not go far enough. However, if both bearings can be poured at the same instant the chance of going wrong is very much diminished. Nevertheless, crusher bearings are usually large enough to require the average operator's entire equipment in the babbitting of one bearing at a time. It is in this latter case where the chance of failure is greatest.

In order to get the best possible bearing without boring after pouring it is necessary to follow the usual practice and, in addition, to strap the mandrel down in the bearings against the upward pressure of the babbitt. The reason for this is that

Old cement sacks stored for lining sand cars

babbitt expands upon cooling (a fact which does not seem to be generally known) due to its antimony content. The pressure exerted in this expansion is sufficient to lift the mandrel (even though the main shaft may be the mandrel) causing misalignment of the bearing. The more babbitt in the bearing, the greater is this pressure. Consequently in order to insure a good bearing the mandrel must be strapped down to make the expansion take place lengthwise of the bearing instead of upwards against the mandrel. A little scraping after such a pour, to bring the shaft against a smooth soft bearing surface, will minimize the breaking-in time.

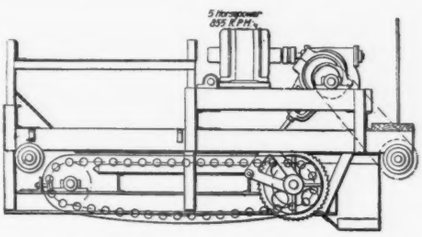
Spontaneous Combustion in Old Cement Sacks

AT THE plants of the Stewart Sand Co., in Kansas City, Mo., old cement sacks are used for stopping the cracks in freight cars to keep the sand from leaking out in transit. These worn out sacks are bought in large quantities from a cement plant and were formerly unloaded from cars in a big pile. It was found that exposed to the weather in this way the sacks heated and finally took fire by spontaneous combustion. To prevent this the sacks are now spread over a field in small piles like "hay cocks" about three feet high, and no further trouble has been noted since this was done.

Variable-Speed Apron Feeder

THE following, from the *Engineering and Mining Journal-Press*, describes one the many machines invented in the metal mining industry which might find a place in the rock products industry:

The ore at the Bunker Hill smeltery is received in four 250-ton bins. From these it is delivered, by an apron feeder, to a belt conveyor that takes it to the Blake crusher. In order to enable the crusher man to attend to the feeding of the ore from the bins, Bradley, Bruff & Labarthe, who designed the smeltery, devised a special type of apron feeder that is self-propelling, and arranged so that the speed



Variable-speed apron feeder

can be varied. A switch in the power circuit of the driving motor enables the man at the crusher to stop or start the feeder.

The chute mouths of each receiving bin are equipped with arc gates. A tiller rope, that fastens over a hook on the side of the apron feeder, holds this gate open so as to permit the ore to travel freely down the chute to the hopper over the apron belt of the feeder. The rate at which the ore is drawn off depends upon the speed at which the belt of the apron feeder is being operated.

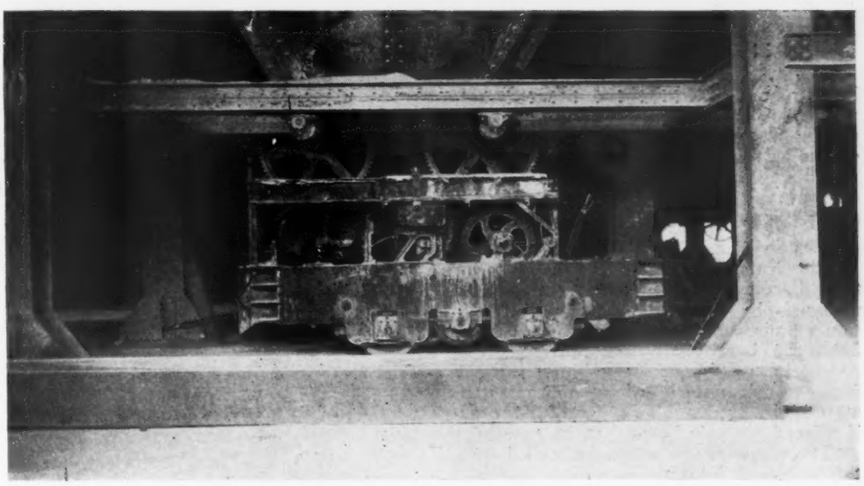
The feeder is driven from a 5-hp. General Electric type K motor through a shaft and eccentric that actuates the apron drive wheel by means of a pawl carried on a rocker arm. The eccentric is of the variable-throw type, so that by locking the two disks in different positions with respect to one another, the number of teeth that the pawl will be pushed over, and so the distance that the apron belt will be pulled ahead on the return stroke of the eccentric, can be varied according to requirements.

A sprocket wheel mounted on the main driving shaft of the feeder connects by means of a detachable chain belt to another sprocket wheel carried on one of the axles of the feeder carriage. Thus, by throwing the driving sprocket into gear by means of a lever, the feeder can be moved along the track from one chute to another at a speed of 80 ft. per minute.

The adoption of this feeder permits the crusher man to spend practically all his time at the crusher, where, by means of the switch, he can immediately stop the feeder in case anything goes wrong. The feeder has a wide range of application

Gasoline Locomotives Handle Lime in Plant

THE Ohio Hydrate and Supply Co., Woodville, Ohio, is using several Plymouth gasoline locomotives to handle cars of lime drawn from the kilns to transfer it to the cooling bins. This use for gasoline locomotives is new to the editors. It is said to prove quite satisfactory. The usual lime plant is sufficiently well ventilated to offer no objections to the use of gasoline motors.



Tracks under kilns for narrow-gage cars permit handling of lime with gasoline locomotive

Answers Chairman Gary's Attack on the Sand and Gravel Producers

THE UNFAIR, unnecessary and untrue attack of Chairman Gary of the Missouri State Highway Commission upon the integrity of the Missouri sand and gravel producers and upon the industry in general, has been answered in a masterly fashion by T. R. Barrows, secretary of the National Sand and Gravel Association. Mr. Barrows' reply, prepared in cooperation with the executive committee of the association in the session at Chattanooga, Tenn., was telegraphed to the *Kansas City Journal*, which published Mr. Gary's original interview, and was published by the *Journal* in full in its succeeding issue.

ATTACK ON SAND PRICE REPEATED

BARROWS, IN CHATTANOOGA, REPLIES TO GARY'S STATEMENT

T. R. BARROWS, executive secretary of the National Sand and Gravel Association, in a statement made in Chattanooga, Tenn., recently, reiterated his attack on the Missouri state highway commission, published in the current issue of "The Bulletin," the official organ of the association.

The state highway commissioners were scored in "The Bulletin" for having closed with the Woods Brothers corporation a 20 cent a ton contract for 100,000 tons of sand, from river deposits, for use in construction of highways.

Theodore Gary, chairman of the state highway commission, ridiculed the attack on the commission. Mr. Barrows replied to Mr. Gary last night. His statement:

"I deny Mr. Gary's statement that the Kansas City sand producers are interested in the welfare of the state's highway program only from the standpoint of selling and to the commission at a high price.

"I repeat that if the commission prepares this sand to meet its own specifications it will cost much more than if purchased from the commercial producers.

"The sand being produced by Woods Brothers and by the Kansas City producers comes from river deposits. No attempt has been made to eliminate from the Woods Brothers sand the silt, sticks, large pieces of lignite and other foreign matter it now contains Commercial producers in the Kansas City district are compelled to build costly plants to prepare their material so it may meet the requirements of the Missouri state highway commission for first class concrete.

STANDS FOR GOOD MATERIALS

"The National Sand and Gravel Association discourages the sale of unsuitable materials by its members. This association stands for the production and use of only the best quality of materials. It promptly would condemn any attempt made to sell material of the character the state highway commission proposes to use if offered for sale by any of its members.

"The investigation which has called forth this criticism by Mr. Gary was made by disinterested producers at my request and after Mr. Piepmeier had invited me to Kansas City to make a personal and official investigation of the sand furnished by Woods Brothers.

"The reliability and business standing of this investigating committee may be ascertained by reference to any commercial agency or inquiry in the communities in which they live. I believe the Kansas City producers are no different than others in the same business and who realize their industry may be built up only on the basis of quality of product. They are interested in the life and durability of the type of work the state proposes to construct and an order for 100,000 tons of sand, when divided among them or even given to one concern, would not affect their operation materially.

"As to the actual cost of this Woods Brothers sand, evidently the commission has not thoroughly studied the freight differential question. Only in four counties is this differential less than 20 cents and in no case is it less than 10 cents instead of the 5 cents claimed by the state highway engineers. State Highway Engineer Piepmeier's original statement was to the effect the state was paying 20 cents for its stand He since has revised that statement to read 43.7 cents.

SAYS FIGURES ARE CORRECT

"His ultimate and final revision will show a cost in excess of the local market price for prepared sand. I still maintain my figures given in the *National Sand and Gravel Bulletin* and to which exception has been taken are more nearly correct than those of Mr. Piepmeier. I also repeat there can be no comparison in quality between the commercial sand and the indifferent kind he proposes to use.

"I again draw attention to the fact the sand produced by Woods Brothers and the Kansas City producers both come from river deposits. Therefore, if this so called 20 cent sand is satisfactory, why have any state highway specifications which require heavy investment by the commercial producers?"

The editors are informed that the state of Missouri has already begun the construction of a screening and washing plant to handle this much discussed 100,000 tons of sand; and that on the strength of the Missouri State Highway Department acceptance of it, Woods Brothers are selling similar dredged material to the city of Kansas City, Kan., for pavement construction. The family of Mr. Gary, the chairman of the Missouri State Highway Commission, is said to be interested financially in the Woods Brothers company.

South Dakota State Cement Plant Has Ambitious Sales Plans

THE South Dakota state cement plant, at Rapid City, representing an investment of state funds amounting to $1,750,000, is nearing completion. Its output will be 2000 bbls. a day.

No price-cutting will be done by the new company, the board of directors announced. It will be run to sell cement at normal market prices, making as much as possible. All profits then will be diverted to the general funds of the state, reducing the tax levy, it is believed, considerably. It will not compete with other cement plants which may be organized.

Because the output will almost certainly exceed the market for the present, it is believed the plant will greatly hasten and facilitate the adoption of a concrete road program by the state of South Dakota.—*Sioux Falls (S. D.) Press.*

Freight rates which will make possible shipments of cement from the state cement plant at Rapid City to any point in South Dakota, practically all of Wyoming, all of western Nebraska, two-thirds of eastern Nebraska, a part of Montana and northeastern Colorado on a fair competitive basis were announced recently by E. H. Bachemeyer, sales manager for the plant, and A. C. Hunt, secretary of the state cement plant commission.

"Rates on cement shipped to points in South Dakota have been successfully arranged by the state board of railroad commissioners," Mr. Backemeyer said. "Railroads affected have advised us that these will be in full effect within the month."

The two officials pointed out other adjustments in territory adjacent to South Dakota, which will make possible interstate shipments of the product, finally assured by various railroads concerned at a conference in Chicago.

"We now have a rate basis equal to any other cement mill in this western territory," Mr. Backemeyer declared. "We can ship to the Colorado line before meeting competitive freight rates from Colorado mills. From the Colorado line north and northwest we have lower rates than any other producing mill up to the Montana state line.

"We also have favorable rates half way east across the state of Nebraska and others that will make possible shipment of our product as far east as Omaha, Council Bluffs and Sioux City. Negotiations are under way to obtain rate adjustments in North Dakota, where at present the cement plant has no arrangement.

"The existing condition, therefore, gives the cement plant a shipping radius with non-competitive freight rates of more than 500 miles and in a large part of this territory, rates from the South Dakota plant will be lower than those of any other competitor."—*Yankton (S. D.) Press.*

Editorial Comment

Practical Optimism

What, on the face of it, appears to be a curious situation exists in one of the centers of the Pennsylvania silica sand industry. One plant was found running part time and another shut down entirely for want of orders. Yet the plant that was shut down was going ahead at full speed with the construction of another 500-ton unit. The reason for this construction activity is that the company officials *feel certain* the demand is coming back strong, and they also foresee competition that will make it necessary to produce at a lower cost. This is practical optimism.

State-Operated Rock-Products Enterprises

Those who have read ROCK PRODUCTS hardly need to be reminded that we are strongly opposed to government ownership and operation of rock products plants, be they for the production of sand, gravel, crushed stone, cement, lime or what not. We are opposed to government ownership not merely as a matter of business and editorial policy but because the editors and managers and owners are fundamentally opposed to government ownership from personal conviction and individual selfishness. That we would not like to see the government enter *our* publishing business is obvious; and we have enough brotherly feeling and understanding for other men of enterprize to sympathize with them in their lines of endeavor.

Moreover, government ownership, at least all such as we are acquainted with to date, is economically wasteful, and unsound from both political and economic points of view—according to our humble opinion.

Why the rock products industries, and the portland cement industry in particular, have been selected for the latest experiments in government ownership we frankly don't know, unless it is because these are comparatively new industries and have not been experimented with before—or because they offer the easiest point of attack.

We have no doubt that these state-owned rock products operations will eventually fail, just as many similar government experiments have failed in times past, because, under conditions as we find them in present-day civilization, there is no substitute for personal initiative and enterprize in the accumulation of national wealth —and as is the case with individual citizens, so it is with a nation—power and influence in the world is largely a matter of wealth. And every American of every political faith wants the United States to be *the* world power.

ROCK PRODUCTS *does not* believe that "throwing a fit," foaming at the mouth, and hurling epithets of liar, scoundrel, thief and crook, either directly or by inference, at public officials is going to help convert them from government ownership Having some knowledge of human nature and of the ways and methods of politicians, we believe on the contrary, that this, coming from the producers, is playing directly into the hands of politicians and strengthening them in the estimation of an ill-informed and almost invariably biased public.

There exists in this country a privately endowed Bureau of Municipal Research. We don't know how wide is the scope of its present or possible functions, but either this or some other similar institution supported by honest, honorable and public spirited citizens could investigate and run down such claims for the success of state enterprises as those quoted elsewhere in this issue of ROCK PRODUCTS from Governor Groesbeck of Michigan.

If his claims are substantiated portland cement manufacturers can learn much from the operation of this state cement plant. If his claims are false they will be so designated by such an authority in such a way that there will be no gainsaying them, and both Governor Groesbeck and all his tribe will be more cautious about making similar claims in the future.

It is hardly necessary to repeat the already familiar unfair phases of state ownership, but in this issue of ROCK PRODUCTS there is a particularly flagrant example, which is worth calling special attention to. The South Dakota State Board of Railroad Commissioners has granted the South Dakota State Board of Cement Commissioners special railway rates to every point in the state, so that the state-owned cement plant at Rapid City can begin business at a most unfair advantage over its established competitors! A typical example of how you can take money out one pocket of the gullible public and put it in another and make them believe they are the richer for it.

We are aware such news items as those referred to do not make *pleasant* reading to producers in the rock products industry, but we would be seriously delinquent in our duty to the industry if we did not bring them to the attention of producers. The reader who sees in them only an excuse to condemn ROCK PRODUCTS for reprinting them is not one whit more intelligent than the ostrich who sticks his head in a hole to escape his pursuers. The reader who has any sense of their significance not only to *his industry* but to the *welfare of his country* will give them serious thought and study —and arrive at some better solution than some such fervid and ineffectual ravings as we have seen in *so-called official organs* of the interested industries.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Buffalo, N. Y.			1.30 per net ton all sizes			
Chaumont, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.35	1.35	1.25	1.25	1.25	.....
Columbia, Ill.	1.10	1.20	1.35	1.35	1.20	1.20
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	.....	.....
Northern New Jersey	.....	.....	1.40	1.40	1.40	.....
Prospect, N. Y.	1.00	1.40	1.30	1.25	1.25	.....
Walford, Penn.	.....	.....	.....	.....	1.60b	.....
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.50	.....	1.50	1.35	.....	.....
Buffalo, Iowa	.90	.....	1.25	1.05	1.10	1.10
Cypress, Ill.	1.10@1.30	.....	.....	.....	.....	.....
Dundas, Ont.	.90	1.10	1.10	1.05	1.00	1.00
Gary, Ill.	1.10	1.40	1.10	1.10	1.10	1.10
Greencastle, Ind.	1.25	1.25	1.05	1.05	1.05	1.05
Krause, Ill.	1.10	1.20	1.35	1.35	1.20	1.20
Lannon, Wis.	.90	1.10	1.10	.95	.95	.95
Northern Wisconsin	.50@1.75	.....	1.00	.90	.90	.....
River Rouge, Mich.	1.00	1.00	1.00	1.00	1.00	1.00
St. Vincent de Paul, P. Q.	.75	1.25@1.45	1.10	1.00	1.00	1.00
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	.....
Stone City, Iowa	.75	.....	1.20	1.10	1.05	.....
Toronto, Canada	1.90‡	2.25‡	2.25‡	2.25‡	2.00‡	2.00‡
Valmeyer, Ill.	1.10	1.20	1.35	1.35	1.20	1.20
Waukesha, Wis.	1.15	1.15	1.15	1.15	1.15	1.15
Youngstown, Ohio	.....	.....	.....	1.50	1.60	1.60
SOUTHERN:						
Alderson, W. Va.	.75	1.75	1.75	1.60	1.50	.....
Bridgeport and Chico, Texas	1.00§	1.35a	1.30a	1.25	1.25	1.10
Cartersville, Ga.	1.75	1.65	1.65	1.00	1.00	1.00
El Paso, Texas	1.00	1.00	1.00	1.00	.....	.....
Graystone, Ala.			Crusher run with fines out, 1.00 per net ton			
Graysville, Ga.	1.00	1.00@1.25	.....	.85@1.00	.85@1.00	.....
Russellville, Ala.	1.25	1.25§	1.50a	1.15§	1.00a	1.00
WESTERN:						
Atchison, Kans.	.50	.....	2.00	2.00	2.00	1.60‖@2.00
Blue Spr'gs & Wymore, Neb.	.20	1.45	1.45	1.35@1.40	1.25@1.30	1.20
Cape Girardeau, Mo.	1.35	.....	1.25	1.25	1.00	.....
Kansas City, Mo.	1.00	1.65	1.65	1.65	1.65	1.65

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.60	1.35	1.15	1.00	.....
Cypress, Ill.	1.00@1.10	.....	.....	.....	.....	.....
Duluth, Minn.	.90@1.00	2.25	1.90@2.00	1.40@1.50	1.35@1.40	1.35@1.40
El Cerrito, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	.....
E. Summit, N. J.	1.50	2.00	1.80	1.40	1.40	.....
Eastern Maryland	1.10	1.75	1.70	1.60	1.50	1.50
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.75	1.70	1.60	1.50	1.50
Merlden, Middlefield, New Britain, Rocky Hill, Conn.	.60	1.60	1.35	1.15	1.00	1.00
Northern New Jersey	.....	.....	1.40	1.40	1.40	.....
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Richmond, Calif.	.50	.....	1.50*	1.50*	1.50*	.....
San Diego, Calif.	.50@ .75	1.80@1.90	1.60@1.80	1.35@1.55	1.35@1.55	1.25@1.45
Springfield, N. J.	1.60	2.00	2.00	1.60	1.60	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	.....
Columbia, S. C.	.50	.....	2.00	1.50@2.00	.....	.....
Eastern Penn.—Sandstone	1.25	1.65	1.60	1.40	1.40	1.25
Eastern Penn.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite	.75	2.00	1.75	1.25	1.25	1.25
Lohrville, Wis.	1.65	1.65@1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.50	2.00@2.25	.....	1.25@2.00
Northern New Jersey (Basalt)	150	2.00	1.80	1.40	1.40	.....

*Cubic yd. †1 in. and less. ‡Prices include 90c freight. ‖Rip rap per ton. §Dust in. (a) Dust out. (b) less 10c 15 days.

Agricultural Limestone
(Pulverized)

Asheville, N. C. — Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk 2.75

Branchton, Penn. — 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers) 5.00

Bridgeport and Chico, Texas; bulk 5.50

Cartersville, Ga. — Pulverized limestone, all thru 10 mesh 1.75
80% thru 200 mesh 2.65

Chaumont, N. Y. — Pulverized limestone, bags, 4.00; bulk 2.50

Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk 4.00

Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk 3.00

Hillsville, Penn. — Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; 94% thru 50 mesh; sacks, 5.00; bulk 3.50

Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk 2.50

Knoxville, Tenn.—80% thru 100 mesh, bags, 3.75; bulk 2.50

Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk 2.75

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk 3.50

Marion, Va. — Analysis, 90% $CaCO_3$, 2% $MgCO_3$; 42.5% thru 100 mesh, 11.3% thru 80, 20.2% thru 60, 22.8% thru 40, 3.2% thru 20 and under or 75% thru 40 mesh; pulverized, per ton 2.00

Mayville Wis.—59.8% thru 60 mesh 2.35

North Pownal, Vt. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk 3.25

Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers) 5.00

Piqua, Ohio—Total neutralizing power 95.3%; 100% thru 10, 60% thru 50; 50% thru 100 2.10@ 2.25
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.00; bulk 3.50
100% thru 100, 85% thru 200; bags, 7.00; bulk 5.50

Rockdale, Mass. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk 3.25

West Stockbridge, Mass. — Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk 3.25

Agricultural Limestone
(Crushed)

Alderson, W. Va. — Analysis, 90% $CaCO_3$; 50% thru 100 mesh 1.50

Alton, Ill.—Analysis 98% $CACO_3$; 50% thru 4 mesh 1.75

Bedford, Ind.—Analysis, 98½% $CACO_3$, ½% $MgCO_3$; 90% thru 10 mesh 1.50

Bettendorf, Iowa — 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50

Blackwater, Mo.—95% $CaCO_3$; 100% thru 8 mesh 1.00

Bridgeport and Chico, Texas—90% thru 100 mesh; 50% thru 100 mesh; 90% thru 50 mesh, bulk 2.50
50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh; bulk 1.50

Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh 1.50

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Cypress, Ill. — Analysis, 90 to 96% $CaCO_3$; 90% thru 100 mesh and thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh	1.90
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 100 mesh	1.50
Gary, Ill.—Analysis, 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 100 mesh	1.10
Independence, Mo. — Analysis, 94.6% $CaCO_3$, 1.05% $MgCO_3$; 90% thru 10 mesh	1.25
Kansas City, Mo.—50% thru 100 mesh	1.25
Krause, Columbia and Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh	1.10
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 100% thru 4 mesh; 85% thru 10 mesh; 53% thru 50 mesh; 40% thru 100 mesh bulk	2.60
32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk	2.25
Milltown, Ind. — Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 28% thru 100 mesh, 34.4% thru 50 mesh	1.35@ 1.50
Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$ —50% thru 100 mesh; 50% thru 4 mesh	1.50
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:	
Berkeley Springs, W. Va.	2.25@ 2.50
Cedarville, N. J.—Damp	1.75
Dry	2.25
Cheshire, Mass: 6.00 to 7.00 per ton; bbl.	2.50
Columbus, Ohio	1.50@ 1.75
Grays Summit and Klondike, Mo.	2.00
Mapleton, Penn.	2.00@ 2.25
Mapleton Depot, Penn.	2.25@ 2.50
Massillon, Ohio	3.00
Michigan City, Ind.	.50
Mineral Ridge, Ohio	2.50
Pacific, Mo.	2.25@ 3.00
Pittsburgh, Pa.—Dry	4.00
Damp	3.00
Ridgway, Pa.	2.50
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.25
San Francisco, Calif.	3.00@ 3.50
St. Louis, Mo.	1.50@ 3.00
South Vineland, N. J.—Damp	1.75
Dry	2.25
Thayers, Penn.	2.25
Utica, Ill.	1.25 1.40
Zanesville, Ohio	2.50
Foundry Sand:	
Albany, N. Y.:	
Core	1.50
Molding fine, brass molding	2.25
Molding coarse	2.00
Sand blast	4.00
Arenzville, Ill.:	
Core	.75
Molding fine	1.40@ 1.60
Brass molding	1.75
Cheshire, Mass.—Furnace lining, molding fine and coarse	5.00
Sand blast	5.00@ 8.00
Stone sawing	6.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Attica, N. Y.	.75	.75	.85	.75	.75	.75
Buffalo, N. Y.	1.10	.95			.85	
Erie, Penn.		1.00*	1.50*		2.00*	
Farmingdale, N. J.	.58	.48	.75	1.10	1.10	
Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Leeds Jct., Maine		.50	1.75		1.35	1.25
Machias, N. Y.	.75	.75	.75	.75	.75	.75
Northern New Jersey		.50	1.25		1.25	1.25
Pittsburgh, Penn., and vicinity	1.25	1.25	.85	.85	.85	.85
Washington, D. C.—Rewashed, river	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Attica, Ind.	.75	.75	.75	.75	.75	.75
Barton, Wis.		.50@ .60			.60@ .70	.60@ .70
Columbus, Ohio	.75	.75	.85	.75	.75	.75
Covington, Ind.	.75	.75	.75	.75	.75	.75
Des Moines, Iowa	.50	.50	1.25	1.60	1.60	1.60
			Unwashed ballast, .50 ton			
Eau Claire, Wis.	.40	.40	.85@1.25			.85
Elkhart Lake, Wis.	.50	.40	.40	.50	.50	.50
Ft. Dodge, Iowa		1.05	2.05		2.05	
Grand Rapids, M'ch.		.50		.80	.70	.70
Hamilton Ohio		1.00			1.00	
Hersey, Mich.		.50				.70
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	.50@ .60	.50@ .60	1.35@1.55	1.35@1.55	1.35@1.55	1.35@1.55
Mankato, Minn.		.40	.40		1.25	
Milwaukee, Wis.	1.01	1.01	1.21	1.21	1.21	1.21
Minneapolis, Minn.	.35	.35	1.35	1.35	1.35	1.25
Moline, Ill.	.60	.60	1.20	1.20	1.20	1.20
Palestine, Ill.	.75	.75	.75	.75	.75	.75
Riton, Wis.	.40	.20			.40	
St. Louis, Mo., f. o. b. cars	1.18	1.45	1.65§	1.45		1.45‖
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
Summit Grove, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.75	.60	.75	.90	.90	.85
Waukesha, Wis.	.55	.55	.75	.75	.75	.75
Yorkville, Sheridan, Oregon, Moronts, Ill.			Average .58 pit			
Zanesville, Ohio	.70	.60	.60	.60	.90	.90
SOUTHERN:						
Brookhaven, Miss., Roseland La.		.50	1.35			
Charleston, W. Va.	all sand 1.52 f.o.b. cars		all gravel 1.63 f.o.b. cars			
Estill Springs, Tenn.	1.00	.90			.85	.85
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Macon, Ga.	.50	.50		.75	.75	.75
New Martinsville, W. Va.	1.00	.90		1.20		.90
WESTERN:						
Baldwin Park, Calif.		.25@ .35			.50@ .75	
Crushed rock	.90@1.10	.60@ .90	.60@ .90	.60@ .90	.60@ .90	
Kansas City, Mo.			Kaw river sand .75 per ton f.o.b. plants			
Los Angeles, Calif.	.70	.70	1.10@1.15		1.10@1.15	
Pueblo, Colo.	1.10*	.90*		1.75*		1.60*
San Diego, Calif.	50@ .65	.80@ .90	1.40@1.50	1.20@1.30	1.00@1.10	1.00@1.10
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*
Webb City, Mo.	.75	.75	.25@ .75b	.85b	1.25c	1.15c

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Brookhaven, Miss., Rosel'd, La.	.75	.50			1.25	
Dudley, Ky.‡	1.05	1.05		.95		
East Hartford, Conn.			Sand, .65 per cu. yd.			
Elkhart Lake, Wis.	.50					
Gainesville, Texas		.95				.55
Grand Rapids, Mich.				.80		
Hamilton, Ohio					.70	
Hersey, Mich.				.55		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas		.95				.55
Mankato, Minn.			Pit run gravel, .50			
Moline, Ill.	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.						.60
St. Louis, Mo.						1.55
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Zanesville, Ohio	.60	.60				

*Cubic yd.; §⅝ in. and less; ‡crushed rock; ‖2½ in. and less; (a) ¾ in. and less; (b) flint chats; (c) crushed flint.

Miscellaneous Sands

(Continued from preceding page)

Columbus, Ohio:		
Core	.25@	.35
Furnace lining	2.00@	2.50
Molding fine	1.50@	2.00
Molding coarse	1.50@	1.75
Sand blast	3.50@	5.00
Stone sawing		1.50
Traction	.25@	1.00
Brass molding		2.00
Eau Claire, Wis.:		
Roofing sand	3.00@	4.00
Sand blast	3.00@	3.25
Core		1.25
Elco, Ill.:		
Ground silica per ton in carloads	20.00@	31.00
Grays Summit, Mo.:		
Molding fine	1.75@	2.00
Klondike, Mo.:		
Molding fine	1.75@	2.00
Mapleton, Penn.:		
Molding fine, sand blast		2.00
Mapleton Depot, Penn.:		
Molding coarse, roofing sand		2.25
Molding fine		2.50
Traction	2.00@	2.25
Massillon, Ohio:		
Molding fine, coarse, furnace lining and core, traction, stone sawing		2.50
Mineral Ridge and Ohlton, Ohio:		
Core (damp)		1.90
Furnace lining, roofing sand, stone sawing, traction (green)		1.75
Molding fine and coarse (green)		2.00
Montoursville, Penn.:		
Core	1.25@	1.50
Traction		1.25
New Lexington, Ohio:		
Roofing sand		2.00
Molding coarse		1.50
Ottawa, Ill.:		
Crude silica sand	.75@	1.00
Core, furnace lining, steel molding		1.50
Roofing sand	1.50@	4.50
Sand blast		4.50
Pacific, Mo.:		
Core, furnace lining	1.00@	1.25
Molding fine	.90@	1.00
Stone sawing	1.00@	1.75
Molding coarse	.85@	1.00
Ridgway, Penn.:		
Core		2.00
Furnace lining, molding fine, molding coarse		1.25
Traction		2.25
Round Top, Md.:		
Roofing sand		2.25
Traction		1.75
St. Louis, Mo.:		
Core	1.00@	1.75
Furnace lining		1.50
Molding fine	1.50@	2.50
Molding coarse	1.25@	1.75
Roofing sand		1.75
Sand blast	3.50@	4.50
Stone sawing	1.25@	2.25
Traction		1.25
Brass molding	2.00@	3.00
San Francisco, Calif.:		
(Washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@	3.50

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.00	2.25	1.25	1.25	1.15	1.15
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Pa.	2.50	1.00	.....	1.25	.....	.....	.....
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05	1.45	.....	1.45	1.45	1.45	.....
Jackson, Ohio	.....	1.30	.....	1.30	1.30	1.30	.....
Toledo, O.	1.50	1.35	1.50	1.35	1.35	1.35	1.35
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	.....	1.55	.....	1.55	1.55	1.55	.....
Ensley and Alabama City, Ala.	2.05	.80	1.25	1.15	.90	.90	.80
Longdale, Goshen, Glen Wilton, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.	.....	.....	12.00	.....	.....	.....	.....	2.30
Buffalo, N. Y.	.....	.....	.....	12.00	.....	.....	.....	.....
Lime Ridge, Penn.	.....	.....	.....	.....	.....	.....	5.00a	.....
Williamsport, Penn.	.....	.....	10.00	.....	.....	.....	6.00	.....
York, Penn.	.....	10.50	10.50	11.50	.....	.....	8.50	1.65i
CENTRAL:								
Cold Springs, Ohio	.....	10.50	10.00	.....	9.00	.....	10.00	.....
Delaware, Ohio	12.50	10.00	9.00	10.50	.....	.....	9.00	1.60
Gibsonburg, Ohio	12.50	.....	.....	.....	9.00	.....	.....	.....
Huntington, Ind.	.....	9.50	9.50	.....	9.00	.....	8.50	1.50b
Luckey, Ohio	12.50	.....	.....	.....	.....	.....	.....	.....
Marblehead, Ohio	.....	9.50	9.50	.....	.....	.....	8.50	1.50c
Marion, Ohio	.....	9.50	9.50	.....	.....	.....	8.50	1.70j
Mitchell, Ind.	.....	12.00	.....	12.00	11.00	.....	10.00	1.70e
Tiffin, Ohio	.....	.....	.....	.....	9.00	.....	.....	.....
White Rock, Ohio	12.50	.....	.....	.....	9.00	11.00	.....	.....
Woodville, Ohio	12.50†	9.50†	8.50†	.....	9.00	.....	9.00	1.60
SOUTHERN:								
Erin, Tenn.	.....	.....	.....	.....	.....	.....	8.50	1.40*
El Paso, Texas	.....	.....	.....	.....	.....	.....	9.00m	1.50
Graystone, Ala.	12.50	11.00	.....	11.00	.....	.....	8.50	1.50
Ocala, Fla.	14.00	12.00	10.00	.....	.....	.....	11.00	1.60
Varnons, Ala. (f)	11.00	11.00	11.00	11.00	9.50	.75d	8.50	1.50
Wilmay, Ala.	12.50	11.00	.....	11.00	.....	.....	8.50	1.50
Zuber, Fla.	14.00	12.00	10.00	.....	.....	.....	11.00	1.60
WESTERN:								
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	12.50h	.....
San Francisco, Calif.	22.00	22.00	15.00	22.00	.....	.....	.....	2.50
Tehachapi, Calif.	.....	.....	.....	.....	.....	.....	15.00	2.25

*And 1.50; †50-lb. paper bags; (a) F. O. B. Kilns; (b) wooden bbl.; (c) wooden, steel 1.70; (d) 90-lb. bag; (e) 180-lb. wooden bbl.; (f) dealers' prices; (g) to 12.00; (h) to 15.00; (i) 180-lb. bbl.; 2.65, 280-lb. bbl.; (j) steel.

Miscellaneous Sands

(Continued)

San Francisco, Calif. (Direct from Pit)		
Furnace lining, molding coarse, sand blast		3.60
Stone sawing, traction		2.30
Tamalco, Ill.:		
Molding coarse	1.40@	1.60
Brass molding		1.75
Tamms, Ill.:		
Ground silica per ton in carloads	20.00@	31.00
Thayers, Penn.:		
Core		2.00
Molding fine and coarse		1.50
Traction		2.00
Utica, Ill.:		
Core (crude and dry)	.75@	1.25
Furnace lining	1.00@	1.50
Molding fine		.70
Molding coarse		.75
Roofing sand (fine and coarse)	1.25@	2.25
Sand blast		3.50
Stone sawing		1.00
Traction		1.25
Brass molding		1.25
Warwick, Ohio:		
Core, molding fine and coarse (all green) 1.75; all dry		2.50
Traction		2.50
Furnace lining, brass molding (green)		1.75
Zanesville, Ohio:		
Sand blast		2.50
Core		2.00
Molding fine		1.75
Molding coarse	1.50@	1.75
Furnace lining		2.00
Traction		2.00
Brass molding		1.75

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:		
Crude talc (mine run)	3.00@	4.00
Ground talc (20-50 mesh), bags		10.00
Cubes		55.00
Blanks (per lb.)		.08
Pencils and steel workers' crayons, per gross		1.25
Chatsworth, Ga.:		
Crude		4.50
Ground (20-50 mesh), bags extra		6.50
Ground (150-200 mesh), bags	8.00@	10.00
Chester, Vt.:		
Crude		5.00
Ground (20-50 mesh) bags extra	7.00@	8.00
Ground (150-200 mesh) bags extra	8.00@	10.00
E. Granville, Rochester, Johnson, Waterbury, Vt.:		
Ground talc (20-50 mesh) bags	7.00@	10.00
Ground talc (150-200 mesh) bags	10.00@	25.00
Pencils and steel workers' crayons, per gross	.75@	2.00
Emeryville, N. Y.:		
(Air floated)—325 mesh, CL		14.75
LCL, bags included		15.25
Gouverneur, N. Y.:		
Ground, in bags, f. o. b. cars	15.00@	22.00
Henry, Va.:		
Crude talc (mine run) per 2000-lb. ton	3.00@	4.00
Ground (150-200 mesh), bags	8.50@	15.00
Keeler, Calif.:		
(150-200 mesh); carloads, 30 tons or more (bags extra)	20.00@	30.00
Marshall, N. C.:		
Crude		4.50
Ground (20-50 mesh), bags extra		6.50
Ground (150-200 mesh), bags	8.00@	10.00
Natural Bridge, N. Y.:		
Ground talc (300-325 mesh), 200-lb. bags	13.00@	15.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Centerville, Tenn.—B.P.L. 65%, bags		**8.50**
Bulk		**6.50**
Gordonsburg, Tenn.—B.P.L. 68-72%	5.00@	5.50
Mt. Pleasant, Tenn.—B.P.L. 75-78%	6.50@	8.50
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.		**5.50**
Twomey, Tenn.—B.P.L. 65%	7.00@	8.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$10.00	$8.10	$7.80
24x14	10.20	10.00	8.10	7.80
22x12	10.80	10.00	8.40	8.75
22x11	10.80	10.50	8.40	8.75
20x12	12.60	10.50	8.70	8.75
20x10	12.60	11.00	8.70	8.75
18x10	12.60	11.00	8.70	8.75
18x 9	12.60	11.00	8.70	8.75
16x10	12.60	11.00	8.40	8.75
16x 9	12.60	11.00	8.40	8.75
16x 8	12.60	11.00	8.40	8.75
18x12	12.60	11.00	8.70	8.75
16x12	12.60	11.00	8.40	8.75
14x10	11.10	11.00	8.10	7.80
14x 8	11.10	10.50	8.10	7.80
14x 7 to 12x6	9.30	10.50	7.50	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

Ground Rock

Mt. Pleasant, Tenn.—B.P.L. 65%.....	7.00@ 9.00
Twomey, Tenn.—B.P.L. 65%.....	7.00@ 8.00

Florida Soft Phosphate

(Raw Land Pebble)

Per Ton

Florida—F. O. B. mines, gross ton, 68/66% B.P.L.	2.25
70% min. B.P.L.	2.50
72% min. B.P.L.	2.75
75/74% B.P.L.	3.75

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	18.00@19.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	19.00@20.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars		10.50
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Crown Point, N. Y.—Mica Spar		7.00
Easton, Penn.—Slate granules		6.50
Haddam, Conn. — Felstone buff	12.00	12.00
Harrisonburg, Va.—Blk. marble (crushed, in bags	14.50@22.50	14.50@22.50
Ingomar, Ohio (in bags)		6.00@25.00
Middlebrook, Mo.—Red		25.00@30.00
Milwaukee, Wis.		14.00@34.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Phillipsburg, N. J.—Evergreen, bulk	8.00@10.00	8.00@10.00
Creme and royal, bulk	15.00@20.00	15.00@20.00
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Cal.—Crushed quartz, red rock, greenstone, jasper, sacks		*10.00
Tuckahoe, N. Y.—2000 lb.		12.00
Wauwatosa, Wis.		20.00@30.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b. cars, granite	4.50@ 6.00	4.50@ 6.00

*LCL, 10% higher.

Concrete Brick

Prices given per 100 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00@22.00	25.00@35.00
Ensley, Ala. ("Slagtex")	12.50	22.50@33.50
Friesland, Wis.	22.00	32.00
Omaha, Neb.	18.00	30.00@40.00
Philadelphia, Penn.	14.00	20.00
Portland, Ore.	21.00	30.00@60.00
Prairie du Chien, Wis.	14.00	22.00@28.00
Puyallup, Wash.	20.00	30.00@90.00
Rapid City, S. D.	18.00	25.00@40.00
Salem, Ore.	23.00	50.00
Seattle, Wash.	22.00	40.00
Wauwatosa, Wis.	14.00@15.00	28.00@75.00
Winnipeg, Can.	15.50	

Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	15.00@16.50
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich.	11.00
Lancaster, N. Y.	13.50
Michigan City, Ind.	11.00
Milwaukee, Wis. (delivered)	13.00
Plant City, Fla.	10.00@15.00
Portage, Wis.	15.00
Rochester, N. Y.	19.75
Saginaw, Mich.	12.00
San Antonio, Tex.	12.50@13.50
Syracuse, N. Y. (delivered at job)	15.00@16.00
F.o.b. cars	18.00

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrated, Finishing	per ton Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	20.00
Dallas, Tex.	20.00	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	22.00	20.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	21.00	21.00
New York, N. Y.	18.20	13.10
St. Louis, Mo.	24.00	20.00
San Francisco, Calif.	22.60	22.60
Seattle, Wash. (paper sacks)	24.00	.....

Portland Cement

Prices per bbl. and per bag net in carload lots.

	Per Bag	Per Bbl.
Albany, N. Y.	.....	2.62
Atlanta, Ga.	.....	2.35
Boston, Mass.	.....	2.53@3.03†
Buffalo, N. Y.	.....	2.38@2.88†
Cedar Rapids, Iowa	.60	2.44
Cincinnati, Ohio	.61¼	2.47
Cleveland, Ohio	.59¾	2.39
Chicago, Ill.	.55	2.20
Columbus, Ohio	.....	2.44
Dallas, Texas	.53¾	2.15
Davenport, Iowa	.59¾	2.39
Dayton, Ohio	.....	2.48
Denver, Colo.	.63¾	2.55
Detroit, Mich.	.60	2.40
Duluth, Minn.	.54¾	2.19
Indianapolis, Ind.	.60¼	2.41
Kansas City, Mo.	.54¼	2.37
Los Angeles, Cal. (less 5c dis.)	.60	3.08
Memphis, Tenn.	.....	2.60
Milwaukee, Wis.	.58¾	2.35
Minneapolis, Minn.	.60½	2.42
Montreal, Canada (sks. 20c ext.)	.....	1.90b
New Orleans, La.	.....	2.40
New York, N. Y.	.....	2.15@2.65†
Philadelphia, Penn.	.....	2.41@2.81†
Phoenix, Ariz.	.82½	3.30
Pittsburgh, Penn.	.54¾	2.19
Portland, Ore.	.....	3.05
San Francisco, Cal.	.....	2.61*
St. Louis, Mo.	.57½	2.30
St. Paul, Minn.	.60½	2.42
Seattle, Wash. (10c bbl. dis.)	.....	2.90
Toledo, Ohio	.61¼	2.45

NOTE—Add 40c per bbl. for bags.
*5c cash disc. 10 days.
†Prices to contractors, including bags.
(b) Less 10c 20 days.

Mill prices f. o. b. in Carload Lots to Contractors

	Per Bag	Per Bbl.
Buffington, Ind.	.48¾	1.95
Concrete, Wash.	.....	2.60
Dallas, Texas	.....	2.05
El Paso, Tex.	.70	2.08*
Hannibal, Mo.	.....	1.95
Hudson, N. Y.	.....	2.05
Leeds, Ala.	.....	1.95
Los Angeles, Calif.	.....	2.65
Louisville, Ky.	.....	2.35
Northampton, Penn.	.....	1.95
Phoenix, Ariz.	.....	4.30†
Steelton, Minn.	.50	2.00
Universal, Penn.	.48¾	1.95

*Gross, 10c sacks and 10c per bbl. disc 10 days.
†Gross, 15c sacks and 5c per bbl. disc. 10 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	¼x32x36" Plaster Board Weight 1500 lb. Per M Sq. Ft.	⅜x32x36" Plaster Board Weight 1850 lb. Per M Sq. Ft.	⅜x32 or 48" Wallboard, Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Agatite, Texas (a)	.....	.....	6.00	10.00	10.00	10.50	10.00	.....	19.00	.....	.....	.....	.....
Akron, N. Y. (a)	3.00	4.00	6.00	10.00	10.00	10.00	20.20	7.00@9.00	27.35	21.00	19.375	20.00	30.00@32.00
Black Hawk, S. D.	3.50	.....	7.00	10.00	10.00	10.50	.....	.....	.....	.....	.....	.....	.....
Blue Rapids, Kans. (a)	2.50	4.00	6.00	10.00	10.00	10.50	10.00	.....	23.15	19.00	19.375	20.00	.....
Denver, Colo.	.....	.....	.....	11.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas, Ariz.	.....	.....	6.00	.....	15.00	.....	.....	.....	.....	15.50	.....	.....	.....
Ft. Dodge, Iowa (a)	2.50	4.00	6.00	10.00	10.00	10.50	15.45	.....	22.70	20.00	19.375	20.00	30.00
Grand Rapids, Mich.	2.75	.....	6.00	10.00	10.00	10.00	.....	.....	.....	.....	.....	.....	.....
Gypsum, Ohio (a)	2.75	4.00	6.00	10.00	10.00	10.00	19.25	7.50	26.85	19.00	19.375	20.00	30.00
Port Clinton, Ohio	3.00	4.00	6.00	8.00	10.00	10.00	.....	7.50	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	12.00	12.00	15.40†	.....	.....	16.40‡	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Bags, 10c each; Paper Bags, $1.50 per ton extra (not returnable).
†CL.; LCL., $16.50; ‡finishing, CL.; LCL., $17.50; (a) prices are net of bags.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert,
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning August 4:

Western Trunk Line

4028. Stone, crushed, ground, broken and fluxing. Carloads, from Group H (Galesburg) to stations not provided for in Groups 1 to 28, inclusive, of Item 2195, W. T. L. Trf. 50K. Present and proposed rates, as follows in cents: Present, Item 2195, crushed stone, minimum 90% capacity; proposed, crushed, ground, broken and fluxing 90% capacity.

Group		Present	Proposed
1	Manchester	.....	12
2	Cedar Rapids	10½	10½
3	Iowa City	10½	10½
4	Oskaloosa	11	11
5	Ottumwa	.....	11
6	Waterloo	13½	13½
7	Reinbeck	13½	13½
8	Marshalltown	11½	11
9	Montezuma	11	11
10	Waverly	13½	13½
11	Mason City	14	14
12	Ackley	14	14
13	Iowa Falls	16	16
14	Boone	.....	12½
15	Ft. Dodge	17	17
16	Cambridge	12½	12½
17	Des Moines	12½	12½
18	Albert Lea	13½	13½
19	Faribault	13½	13½
20	Mankato	14½	14½
21	Mexico	.....	12
22	Chillicothe	.....	11½
23	Shenandoah	.....	11½
24	Manning	.....	11½
25	Lake City	.....	17
26	Sheldon	.....	17
27	Hawarden	.....	18
28	Macon	.....	10½

Minimum weight 90% of marked capacity of car.

2292B. Stone, crushed. Carloads, from Ely, Minn., to Chicago, Ill., and St. Louis, Mo. Present, to Chicago, 15 cents; to St. Louis, 22½ cents per 100 lb.; proposed, to Chicago, 13½ cents; to St. Louis, 18 cents per 100 lb. Minimum weight 80,000 lb.

4033. Plaster, stucco, etc. Carloads, from Centerville, Iowa, to Waldo, Westport and Dodson, Mo. Present, 13½ cents, minimum 60,000 lb., and 17 cents minimum 30,000 lb., plus $15 per car switching of the K. C. W. B. Ry.; proposed, Kansas City, Mo., rates.

853B. Sand. Carloads, as described in Items 770, 1720, 1730, 1735, 1740, 1750 and 1755, W. T. L. Trf. 49N, I. C. C. A1480, from Bay City, Eau Claire, Portage and Wausau, Wis., also Red Wing, Minn., to C. F. A. points. Present and proposed, to a few points representative of the situation:

	From Red Wing, Minn.		From Bay City, Wis.	
To	Pres.	Pro.	Pres.	Pro.
Cincinnati, Ohio	$4.59	$4.85*	$4.29	$4.55‡
Louisville, Ky.	4.72	4.89†	4.42	4.68‖
New Albany, Ind.	4.59	4.85*	4.59	4.55‡
Sharon, Penn.	5.22	5.48	4.92	5.18
W. Newton, Penn.	5.48	5.88	5.18	5.88

	From Bay City, Wis. Red Wing, Minn.		From Wausau, Wis.	
To	Pres.	Pro.	Pres.	Pro.
Buffalo, N. Y.	$5.22	$5.48	$4.72	$4.98
Detroit, Mich.	4.09	4.34	3.59	3.84
Erie, Penn.	5.22	5.48	4.72	4.98

	From Eau Claire, Wis.	
To	Present	Proposed
Detroit, Mich.	$3.49	$3.74

	From Portage, Wis.	
To	Present	Proposed
Hamilton, Ont.	$4.72	$5.28

*On sand, other than blast, engine foundry, glass, lake, molding or silica, $4.62.
†On sand, other than blast, engine, foundry, glass, lake, molding or silica, $4.75.
‡On sand, other than blast, engine, foundry, glass, lake, molding or silica, $4.32.
‖On sand, other than blast, engine foundry, glass, lake, molding or silica, $3.93.
Minimum weight 90% of marked capacity of car, but not less than 40,000 lb.

Southwestern Freight Bureau

1650. Gravel. To establish rate of 11½ cents per 100 lb. on gravel, washed, carloads, minimum weight 60,000 lb., from Horatio and Neal Springs, Ark., to T. & Ft. S. Ry. stations, Ruliff to Port Arthur, Texas, inclusive. Proposed rate is now provided to a portion of the destinations on T. & Ft. S. Ry., and it is desired that additional T. & Ft. S. Ry. stations be added at the 11½ cent rate in order to clear fourth section and care for all T. & Ft. S. Ry. destinations in Southeast Texas.

1653. Cement. To establish rate of 20½ per 100 lb. on cement, carloads, as described in S. W. L. Trf. 90E. From Harrys and Eagle Ford, Texas, to Arkansas points on the St. L. S. W. Ry., except to points Collier to Waldstein, inclusive, establish a rate of 24 cents. This change is desired in order to place rates from Harrys and Eagle Ford on a proper relationship to rates in effect from Cape Girardeau, Mo.

1654. Cement. To establish the following rates in cents per 100 lb. on cement, carloads, as described in S. W. L. Trf. 90E from Harrys and Eagle Ford, Texas, to stations in Louisiana on the K. C. S. Ry., as shown below: Caddo Refinery Spur to Cedar Grove, La., inclusive, 19 cents; Shreveport G. & B. Co., to Mansfield, La., inclusive, 22½ cents, and Texas Company Spur to Kearney, La., inclusive, 23½ cents. Proposed change is desired to place rates from Harrys and Eagle Ford on a proper relationship to rates in effect from other producing points.

1722. Chat sand. To establish rate of $3.53 per net ton of 2000 lb. on chat sand, carloads, minimum weight 100,000 lb., from Joplin and Webb City, Mo., to Bedford and Bloomington, Ind. The rate proposed is based upon the competition which the Joplin producers must necessarily meet from Ottawa, Ill., in order to successfully market their output in the Bedford district; in fact, it is claimed that $3.53 is the maximum figure under which the sand may move.

1728. Stone or rock. To establish rate of 29½ cents per 100 lb. on stone or rock, crushed or ground, carloads, stone (exclusive of marble), rough quarried, minimum weight 50,000 lb., from Ponder, Texas, to Vicksburg, Miss. Under Subject No. 1285 rate of 29½ cents per 100 lb. is proposed on crushed or ground stone or rock from Ponder, Texas, to New Orleans, La. Rates from Ponder, Texas, to Vicksburg are the same as to New Orleans; namely Class E rate, and this proposal is intended to continue the existing relationship.

1741. Sand, stone and gravel, etc. To establish a rate of 4½ cents per 100 lb. on sand, stone and gravel, etc., as described in Item 750 of S. W. L. Trf. No. 114A, from Crow Creek and Madison, Ark., to Memphis, Tenn. It is claimed the proposed rate is necessary to meet competition.

Southern Freight Association

15015. It is proposed to revise the present rate of $1.35 per net ton on crushed stone, carloads, from Franklin, Tenn., to Memphis, Tenn., applicable via the N. C. & St. L. Ry., to be the same as applicable via the L. & N. R. R., i.e., $1.325 per net ton.

15017. Cement. Carloads, from North Birmingham, Ala., to L. & N. R. R., Nashville & Decatur Division, Columbia to Lynville, Tenn., inclusive. Present, 12½ cents; proposed, 11½ cents per 100 lb., same as from Birmingham and Boyles, Ala.

15023. Slag. Carloads, from Birmingham, Ala., and Group, to A. C. L. R. R. stations between Waycross and Brunswick, Ga. Combination rates now apply. It is proposed to establish rates on basis of the proposed Alabama-Georgia slag scale. Proposed rates to representative points are: Colgans Still, $1.94; Nahunta, $1.98; Saynesville, $2.03; Pyles Marsh, $2.03 per net ton.

15026. Sand (except molding sand). Carloads, from Dixiana, S. C., to Hemlock, Tenn. Lowest combination now applies. Proposed, $1.80 per net ton, based on the proposed Georgia scale, reduced 10%, for the Joint distance of 298 miles.

15068. Slag. Carloads, from Birmingham, Ala., and group to Cordova, Tenn. Combination now applies. Proposed, $1.76 per net ton, all switching charges to be in addition to the rate. Proposed rate is based on the proposed Georgia-Alabama scale, less 10%.

15079. Slag. Carloads, from Birmingham, Ala., and group and Alabama City, Ala., and group to Georgia and Florida Ry. stations, Valdosta, Ga., to Madison, Fla., inclusive. It is proposed to reduce present rates to be as follows: To Valdosta, Ga., $1.89; to Hicks and Dees, Ga., $2.24 to stations Briggston, Ga., to Madison, Fla., inclusive, $2.25 per net ton. Proposed rates made on basis of the proposed Georgia-Alabama scale, observing the proposed rate to Madison, Fla., as maxima.

15087. Sand and gravel. Carloads, from Montgomery, Ala., to points in North and South Carolina. No through commodity rates in effect and lowest combination applies. It is proposed to establish commodity rates on basis of mileage scale submitted by carriers to the Georgia-Alabama Public Service Commission, less 10%.

15118. It is proposed to establish a rate of 10½ cents on cement, carloads, from Chattanooga, Tenn., to Athens, Tenn., 12½ cents to Knoxville and 17 cents per 100 lb. to Vance, Tenn., these rates to include connecting lines switching at Chattanooga, Tenn., in lieu of present rates as published in Agt. Glenn's I. C. C. A455. Proposed revision represents reductions.

15130. Stone, crushed. Carloads, from Ottawa, Ill., to Memphis, Tenn. Present, 43 cents per 100 lb. (Class A); proposed, $3.00 per net ton. The proposed rate is for the purpose of meeting competition at Tate and Stone Mountain, Ga.

15161. It is proposed to revise the present rate on cement, carloads, from Kingsport, Tenn., to Jewell, Va., from 14½ cents to 15 cents per 100 lb., or the same as the rate to points intermediate; namely, Seaboard and Lark, Va.

15237. Stone, crushed or rubble, stone screenings, slag, chert, sand and gravel (washed or unwashed). Carloads, between stations in Florida south of Baldwin, Fla. No commodity rates now in effect. It is proposed to establish rates on basis of the following scale: 425 and over 400 miles, $1.96; 450 and over 425, $2.03; 475 and over 450, $2.10; 500 and over 475, $2.17; 525 and over 500, $2.24; 550 and over 525, $2.31; 575 and over 550, $2.38; 600 and over 575, $2.45; 625 and over 600, $2.51; 650 and over 625, $2.57; 675 and over 650, $2.63; 700 and over 675 miles, $2.69 per net ton.

15255. Cement. Carloads, from Kingsport, Tenn., to Walton, Band Lick, Independence and Maurice, Ky. Combination rates now apply via L. & N. R. R. It is proposed to establish to Walton, Ky., via L. & N. route, rate of 19½ cents per 100 lb., same as in effect in connection with the C. N. O. & T. P. Ry., with rate to other destinations named, same as proposed to Walton, Ky.

Illinois Freight Association

2662. Lime. Carloads, minimum weight 30,000 lb., from Hannibal, Mo., Quincy, Ill., and Marblehead, Ill., to stations on the C. I. & W. R. R., Blackland, Ill., to East Springfield, Ill. Present, Class C (varying); proposed, 13½ cents.

2666. Stone, crushed. Carloads, minimum weight 90% of marked capacity of car; except when car is loaded to full cubical or visible capacity actual weight will apply, but not less than 40,000 lb., from Lehigh, Ill., to St. Anne, Ill., to apply via N. Y. C.-Kankakee, Ill.-C. C. C. & St. L. Ry. Present, 76 per net ton; proposed, 63 cents per net ton.

2675. Sand and gravel. Carloads, minimum weight 90% of the marked capacity of car; except when loaded to full visible or cubical capacity, actual weight will apply, from Ottawa, Yorkville, and Sheridan, Ill., to Seaton, Ill. Present, 13 cents (Class E); proposed, $1.26 per net ton.

2678. Limestone or lime rock, broken, crushed or ground. Carloads, minimum weight marked capacity of car, but not less than 80,000 lb., from Mosher and Ste. Genevieve, Mo., to Waukegan, Ill. Present, Combination; proposed, $2.55 per net ton.

2585A. Silica sand. Carloads, minimum weight 90% of marked capacity of car; except when loaded to full visible capacity actual weight to apply, but not less than 40,000 lb., from Ottawa, Ill., to Centralia, Ill. Present, $1.50 per net ton; proposed, $1.64 per net ton.

Central Freight Association

8907. Sand and gravel. Martinsville, Ind., to Bedford, Mitchell and French Lick Springs, Ind. Present, $1.01 per net ton to Bedford, Ind.; 13½

cents to Mitchell, Ind., and 15 cents to French Lick Springs. Proposed, 88 cents per net ton to Bedford; 95 cents per net ton to Mitchell, and $1.01 per net ton to French Lick Springs.

8944. Sand (other than blast, engine, foundry, glass, molding or silica) and gravel. Tecumseh, Mich., to Maumee, Ohio. Present, $1.115 per net ton; proposed, $1.04 per net ton.

8964. Crushed stone. Gibsonburg and Woodville, Ohio, to Napoleon, Ohio. Present, 6th class; proposed, 90 cents per net ton.

8965. Slag. Buffalo, N. Y., to Jamestown, N. Y. Present, 13½ cents; proposed, $1 per net ton.

8971. Sand and gravel. Cement City, Mich., to Ohio, in cents per net ton:

To	Present	Proposed
Alvordton	75	70
West Unity	75	70
Pulaski	75	70
Bryan Jct.	75	70
Bryan	95	70
Flynn	95	70
Burt Siding	95	70
Ney	95	70
Moats	95	70
Sherwood	98	70
Cecil	98	70
Whites Crossing	98	70
Vinegar Switch	98	70
Paulding	98	70
Latty	98	70
Haviland	110	70
Scott	110	80
Cavett	110	80
Van Wert	120	80
Ohio City	120	90
Rockford	120	90
Dyserts Crossing	120	90
Tama	120	90
South Tama	120	90
Celina	120	90

8972. Gravel; sand, other than blast, engine, foundry, glass, loam, marl, molding and silica. Richmond, Ind., to Brooklyn, Ind. (Penn. R. R. delivery). Present, 15 cents; proposed, 90 cents per net ton.

8973. Sand. Rush Run, Ohio, to Lorain, Ohio. Present, 18½ cents; proposed, $1.30 per net ton on sand, carloads, in open-top equipment, and $1.50 per net ton on sand, carloads, in box-car equipment.

8974. Sand and gravel. Pleasant Lake, Ind., to St. Joe, Ind., and Ohio. Per net ton,

		——Present from——	
To		Pleasant Lake, Ind. Molding,	
(B. & O. R. R.)	Proposed	blast, etc.	common
St. Joe, Ind.	$0.97	$1.13	$1.04*
Hicksville, Ohio	.97	1.13	1.04
Sherwood, Ohio	.97	1.13	1.04
Defiance, Ohio	.97	1.26	1.07
(Cin. Nor. R. R.)			
Ney, Ohio	.97	1.13	1.04
Moats, Ohio	.97	1.13	1.04
Sherwood, Ohio	.97	1.13	1.04

*On interstate traffic $1.13.

8976. Sand and gravel. Pleasant Lake, Ind., to Garrett, Ind. Present, $1.04 per net ton; proposed, 81 cents per net ton.

8985. Crushed stone. Woodville, Ohio, to Brailey, Wauseon and Old Fort, Ohio. Present, 6th class; proposed, 80 cents to Old Fort, Ohio.

Indiana Intrastate Rates

IN THREE cases which had been presented to it regarding rates for intrastate shipments on Indiana railroads for crushed limestone for farm purposes and for sale, gravel and crushed stone, the public service commission has established a schedule of maximum rates which may be charged on these shipments. The schedule was promulgated in the cases of the Mid-West Crushed Stone Co., concerning shipments from Spencer and Greencastle to points on the C. & E. I. railroad; of the Terre Haute Sand and Gravel Co. for rates from Summit Grove to points on the same railroad, and of the Kickapoo Sand and Gravel Co., on rates from Peru to points on the same road, the Wabash and Nickel Plate roads. The schedule gave two lists of prices, one for single-line shipments and one for shipments which travel over more than one line. The rates by ton, net weight, range from 60 cents in the first list and 70 cents in the second, for 20 miles or less, to $1.50 and $1.55 for from 275 to 300 miles.

President of the Alpha Cement Company Reports Conditions in the Orient

G. S. BROWN, president of the Alpha Portland Cement Co., who has just returned from a three months' study of conditions in the Far East, summarizes as follows his observations on the construction industry in Japan, China and the Philippines:

"The anticipated construction program of the Japanese to replace the buildings lost by earthquake and fire last year has failed to materialize. Temporary structures sufficient to house the people have been erected but little permanent construction has been started and when I was there no one seemed to have any knowledge as to when active, permanent reconstruction would be started.

"There is a surplus in Japan of all sorts of construction materials. Indeed the construction industry is in a depressed condition in all parts of the Far East except in Hong Kong and Shanghai. The disturbed political condition in China prevents any extensive work, while in the Philippines fear that the Islands will be given independence by the United States has the same effect.

"In Hong Kong and Shanghai, however, there is a very large construction program in process. It is said this is financed by wealthy Chinese from the interior of China who are fearful that they will lose their wealth because of the present disturbed political conditions and are therefore putting it in Hong Kong and Shanghai, where the English insure stability of government.

"Of the nations of the world outside of the United States, Japan is one of the largest producers of portland cement. Not only Japan but China and the Philippines also prepared for what was supposed to be a very greatly increased demand for cement because of the reconstruction of the devastated areas in Japan. Failure of this program to materialize has resulted in a very depressed condition and a lower price for cement than has ever been known in the Orient. Japanese cement is of high quality as is also the Philippine product. Cement manufactured in China and Indo-China is not nearly so good.

"The present low price, as nearly as can be found out, is about equivalent to the prices netted by mills in the United States, and I was told that many of the manufacturers were operating at a loss at these prices.

"I was very forcibly impressed by the fact that despite this low price for cement and the highest wages known in those countries, yet a workman in one of the cement factories in the Orient who might wish to use a barrel of cement about his home—if he were fortunate enough to have one—would be obliged to work roughly three days in order to make sufficient money to purchase it, while the average workman in the cement mills of the United States earns enough in one day to purchase three barrels of cement."

The Urschel Lime Company Entertains

THE Yacht "Vencedor," with Commodore W. L. Urschel of the Toledo Yacht Club aboard, paid Buffalo a visit of several days' duration in July and anchored off the Buffalo Yacht Club house at the foot of Porter avenue.

The commodore is president of the William L. Urschel Lime and Stone Co. and he was accompanied by Frank Holland, who is well known to many of our members.

On July 7, through the courtesy of Messrs. Urschel and Holland, the hospitality of the ship was tendered to the supply dealers of the Builders' Exchange. About 15 availed themselves of the opportunity to enjoy a short cruise on the beautiful yacht and all were enthusiastic in their praises of the good ship "Vencedor" and in their appreciation of the entertainment furnished by the owner and his able lieutenant, Mr. Holland.

On July 8, the trip was repeated with a number of mason and plastering contractors as guests and it was a repetition of all the joys of the previous cruise.

The "Vencedor" is, to use a somewhat hackneyed phrase, a vertitable floating palace. She is 90 ft. long with ample beam for comfort and is as staunch and seaworthy as an ocean liner.—*Buffalo Builders' Exchange Bulletin.*

New Redwood Plant of Pacific Portland Cement Company to Start August 15

THE opening of the new Pacific Portland Cement Co. plant at Redwood City, Calif., has caused several changes in the personnel of the present plant at Cement, Calif., and this community will lose some good friends because of the changes. H. M. Power, superintendent at Cement, will leave next month to take charge of the Redwood City plant. He will be succeeded here by M. J. Johnsson, former outside superintendent here.

L. E. Bostwick will leave in a few days for Redwood. Mr. Bostwick is traffic superintendent here and will be succeeded by C. L. Coffey of the same department.

H. M. Larmour is another popular company man to be transferred to Redwood City. He will leave with his family for his new home next week. Mr. Larmour is chief chemist and will be succeeded here by John Butler, foreman of the chemistry department under Larmour.

Others who will be transferred to Redwood City are Scotty Forsythe, William Dubois and H. Haruff. Some of these men will stay only until the plant is running regularly, while others will be located there.

The new plant at Redwood City will open August 15.—*Fairfield (Calif.) Republican.*

New Machinery and Equipment

"The Universal Ford"

THE views herewith show special truck bodies and special tractor trailers developed and manufactured by the Easton Car and Construction Co., Easton, Penn., for quarry work. The steel truck body is designed for a Ford truck chassis and the trailer for a Fordson tractor.

The use of motor trucks in quarries which have smooth floors has been tried out to some extent and there are a few operators, at least, who believe that caterpillar and tractor-wheel shovels and motor trucks go together when conditions warrant. In any event motor trucks have been proved by many operators very helpful pieces of equipment in cleaning up and general utility service about a quarry plant.

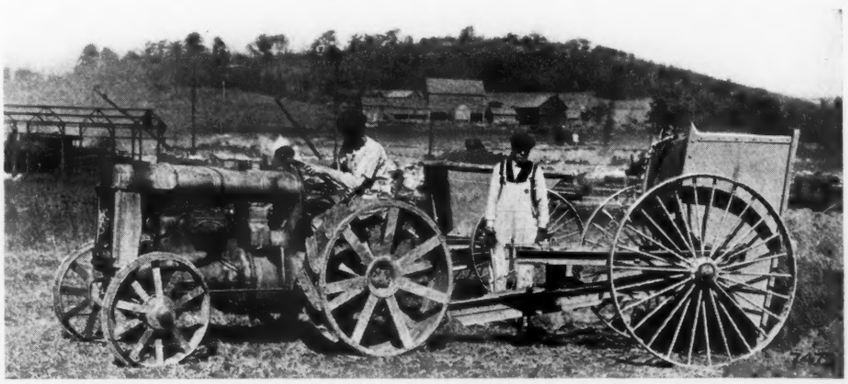
The Easton Car and Construction Co., as probably all our readers know, is one of the principal designers and builders of quarry and gravel pit cars.

The tractor trailer outfit illustrated has proved quite efficient in quarry stripping operations.

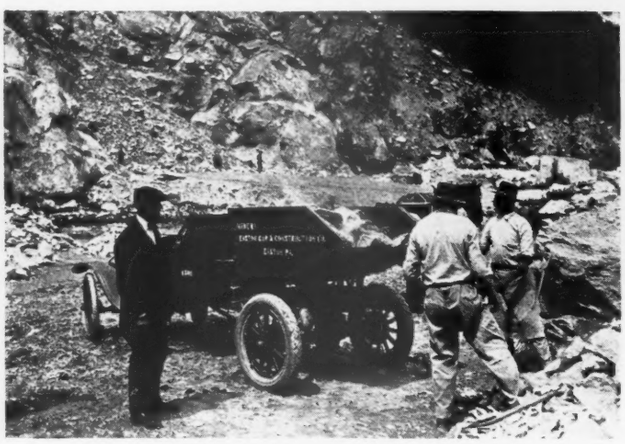
Belt Conveyor Handbook

THE Brown Hoisting Machine Co., Cleveland, Ohio, has recently issued a handbook on "Belt Conveyors" (M-24), which contains a valuable collection of data for all owners and operators of conveyor belts. Several illustrations are taken from the installation of the Ohio River Sand and Gravel Co. at Louisville, Ky.

Tables of engineering data included give capacities, allowable inclinations, proper design of discharge chutes, calculation of number of plies, power required, together with tables of dimensions, capacities, diagrams of typical drives, etc.

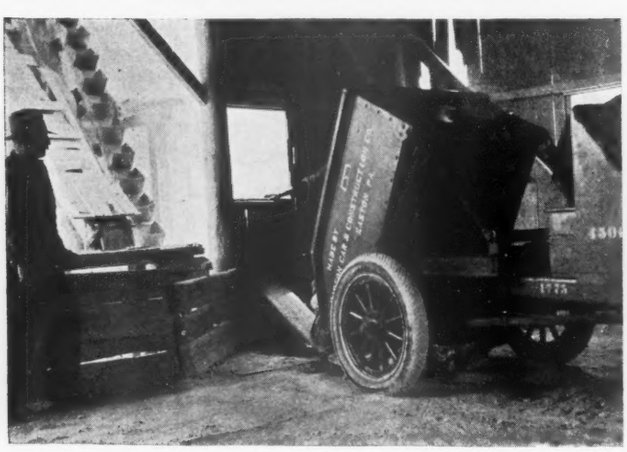


Fordson tractor and Easton trailer used for quarry stripping

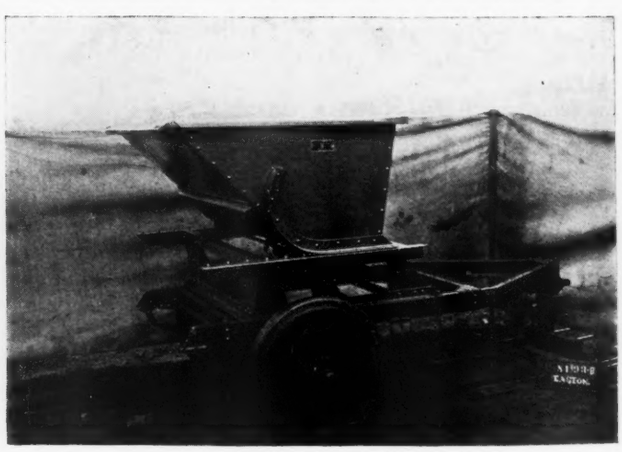


Special Ford truck body for quarry service

Another view showing low body for hand loading



Dumping truck into crusher

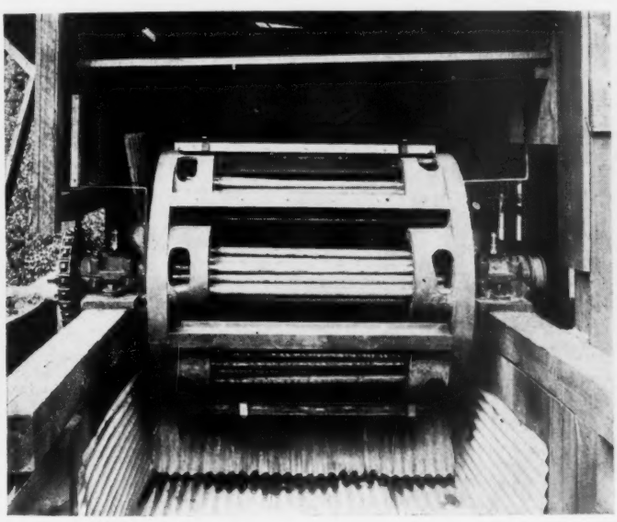


Another type of Fordson trailer

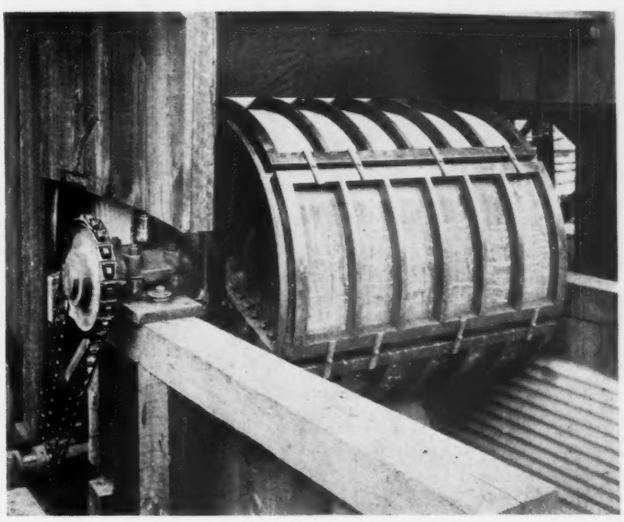
Fordson trailer showing size in towing position

New Development in Grinding

THE Tamaqua Manufacturing Works, Tamaqua, Penn., has obtained the rights to manufacture and sell in the East the "Giant" pulverizing mill patented by Carl S. Willis, Bellingham, Wash.



"Giant" pulverizing mill with cover removed



Another view of new grinding mill

For this pulverizer several distinct advantages are claimed over other types of ball and rod mills: (1) The grinding element has its weight distributed around the circumference of the mill, thereby reducing the power required for operating to about 20% of that required by other types of ball and rod mills. (2) This mill has the advantage in that the material being ground drops out through the screens as soon as it reaches the proper mesh. On account of this factor, material is not held in the mill and ground after it has reached the desired fineness. (3) In other types of ball and tube mills it is necessary to screen the ground material discharged from the mill, thereby requiring a second operation whereby the tailings from the screens are elevated and returned to the feed end of the mill.

In the "Giant" mill, however, the raw material is fed continuously into both ends of the mill and the ground material is discharged through the screens when it reaches the proper mesh and no separate screening is required.

The first photograph shows the mill with the screen frames removed and the second photograph shows the material with the screens attached.

In operation the mill is inclosed in a dust-tight cover which ends at the bottom in the form of a hopper from which the ground finished product is conveyed away to storage.

The Milling of Garnet

GRAVITY separation of abrasive garnet from hornblende, minerals which are intimately associated in the New York deposits, presents difficulties owing to the small difference in the specific gravity. It is believed that a detailed study of milling methods would not only be of assistance to garnet producers but the data obtained from such a study would be useful in its application to problems in the milling of other ores and minerals. Such a study will be undertaken by the Department of the Interior, the work being assigned to the New Brunswick, N. J., aud Rolla, Mo., experiment stations of the Bureau of Mines.

Rugg Company Making Well-Drill Rope

A HAWSER-LAID Manila rope of extra strength, especially adapted for use on big blast hole drilling machines, is now being manufactured by the E. T. Rugg Co., Newark, Ohio.

This rope, sold under the trade name of "Ocean Brand Manila with Green Thread Marker," is guaranteed by the company to come up to, or surpass, the U. S. Government Bureau of Standards' specifications in every way. The company announces that it has recently installed rope making machinery of the most modern type and that a high quality oil is used in the manufacturing process for the preservation of the fibre so that it will resist the most severe usage.

The following data is extracted from a table prepared by the company, showing the weight and strength of sizes used for blast-hole drilling purposes:

Diameter in inches	Max. Weight per foot	Min. Breaking Strength
1½	.5879 lb.	17500 lb.
1 9-16	.6615 lb.	19500 lb.
1⅝	.7348 lb.	21500 lb.
1¾	.8818 lb.	25500 lb.
2	1.059 lb.	30000 lb.
2 1-16	1.225 lb.	34000 lb.
2¼	1.441 lb.	38500 lb.
2½	1.646 lb.	43500 lb.

The company claims to be manufacturers of cordage since 1883 and that it is equipped to furnish rope in all sizes from ¼- to 3¼-in., for general, as well as for blast-hole drilling purposes.

THE STURTEVANT MILL CO., Boston, Mass., has issued looseleaf folders bound in an attractive cover giving the line of machinery manufactured by this company, such as crushing, grinding, screening, elevating, conveying, mixing, weighing, sacking, etc.

News of All the Industry

Incorporations

Western Pennsylvania Sand and Gravel Co., Pittsburgh, Penn., has been incorporated for $5000 by A. R. Flynn.

Idaho Marble Co., Lewiston, Ida., has been incorporated for $100,000 by A. J. Warren, H. J. Kressly and Alexander Poison.

Portland Stone Stucco Co., Los Angeles, Calif., has been incorporated for $15,000 by A. D. Guy, G. D. Edgcomb and H. O. Edgcomb.

Maryland Stone and Stucco Co., Darlington, Md., has been incorporated for $50,000 by Daniel Sinclair, G. Lesley Wilson, and Charles A. Swift.

Ridge Sand and Gravel Co., Rochester, N. Y., has been incorporated for $10,000 by H. D. and M. E. Hutcheson. Attorney, W. T. Purchase, Newark, N. J.)

Pyramid Granite Works, St. Cloud, Minn., have been incorporated for $50,000 by Nels Fuhre and others for the purpose of quarrying, cutting, and manufacturing granite.

Merritt Co. has been incorporated under the laws of Delaware for $25,000 to manufacture concrete materials. (Agent, Harry H. Koch, Ford Building, Wilmington, Del.)

Marble Specialty Corporation has been incorporated under the laws of Delaware for $250,000. Product: marble, stone, and rock. T. L. Croteau, Wilmington, Del., attorney.

Walker Brothers Stone Co. has been incorporated at Bloomington, Ind., for $5000 to operate a stone quarry. Incorporators: James Walker, Owen Walker, and William B. Hoadley.

Limestone Products and Supply Co., Bridgeville, Penn., has been incorporated for $40,000 by Joseph F. Hofrichter, Beadling; William T. Lashley, Dormont; and Lawrence J. Hofrichter, Beadling.

Universal Sand and Gravel Co., Los Angeles, Calif., has been incorporated for $50,000, and will begin operations at once. Officials of the company are: James F. McClellan, H. S. Chamberlain, and C. C. Fisher.

Field and Wild Quarry, Inc., Quincy, Mass., has been incorporated for $50,000 to operate granite quarries. Incorporators: August P. Hedberg, Hannah G. Hedberg, Ernest A. Cullman, and Gerde O. Cullman, all of Quincy.

Tombigee Gravel and Sand Co., Columbus, Miss., has been incorporated for $30,000. The officers are: John T. Sanford, president; Gus E. Hauser, vice-president and salesman; Henry M. Beard, secretary-treasurer.

Pittman-Jones Tile Co., Orlando, Fla., has been incorporated for $25,000 to manufacture cement and concrete roofing tile, and kindred products. The initial works will cost close to $17,000, and will be extended later. W. S. Pittman is president.

Landa Rock Products Co., New Braunfels, Tex., has been incorporated for $250,000, to build and operate plants for the manufacture of crushed rock, brick, lime and cement. Directors: Harry Landa, Cuthbert Westbrook, Joseph A. Abrahams, Carl Starr, and W. P. Hathaway.

Dubuque Stone Products Co., Dubuque, Iowa, has been incorporated for $75,000. T. J. Mulgrew, president; Russel Mulgrew, vice-president; and A. F. Schrup, secretary-treasurer. The company will supply crushed stone and fertilizer, engage in street and highway construction and plans to later manufacture lime.

Sand and Gravel

Garden City Sand Co., Chicago, Ill., increased its stock $100,000 to $150,000, and increased directors 3 to 6.

Hill & Belknap, St. Ignace, Mich., recently received a large steam shovel which will be used in the firm's operations at the gravel pit.

Carrollton, Mo.—Pem Gordon of the highway department was here recently investigating sand for the construction of the Bowdry road. He will take several samples from a number of pits to be analyzed by the highway deparment.

Enwood Sand and Rock Co., Roseville, Calif., formerly the Enwood Sand Co., is rushing construction on a modern plant equipped with all machinery necessary to turn out crushed rock and gravel in all grades. The plant is located on the outskirts of Eastern Roseville near Dry Creek. At present fifty men are employed on the construction of the plant under the supervision of Harry W. Flint, who will be superintendent of the plant when it is completed. It will have an initial capacity of about 600 tons a day. According to reports, the plant is about ready to begin operations.

Los Angeles Rock and Gravel Co., Baldwin Park, Calif., formally opened its new rock and gravel bunkers to the public recently with a barbecue. The new bunkers are at the El Monte terminus of the private line of railway which the Los Angeles Rock and Gravel Co. has constructed from their rock crushers at Baldwin Park, to a connection with the main line of the Southern Pacific Railroad at El Monte. The capacity of the new plant is reported to be great enough to provide for the distribution of several hundred loads of sand and gravel daily and the company owns and operates its own engines and rolling stock. H. W. Hawley is president.

Manufacturers

Link-Belt Co., Chicago, Ill., has made the following announcement: The company is now operating nine plants and 25 sales offices, and supreme executive and financial authority has heretofore been delegated by the board of directors to the president. At the board meeting July 24, at

Charles Piez

Alfred Kauffman

the suggestion of Charles Piez, president, the following changes in the organization were made: The chairman of the board was made the chief executive officer of the company, and an executive committee of four was created to act in an advisory capacity to the officers. Mr. Piez was elected chairman of the board and chairman of the executive committee; Alfred Kauffman, newly elected president, Staunton B. Peck, senior vice-president, and Thomas B. Marston, a member of the board of directors, were selected as the other three members of the executive committee. Mr. Kauffman, second vice-president of the company, was elected president, and Mr. Piez, chairman of the board, delegated to him the general direction and supervision of operations and sales. Mr. Peck, as senior vice-president, directs and supervises operations and sales in the Eastern district; Arthur C. Johnson, elected to the position of second vice-president, remains in charge of operations and sales in the Western district, and Humphrey J. Kiely, newly elected third vice-president, continues in charge of exports and sales in the New York district. Mr. Kauffman has been with the Link-Belt Co. for 24 years. His headquarters for the present will be at Indianapolis where the company's largest operations are located.

Quarries

Mid-West Crushed Stone Quarries Co., Indianapolis, Ind., has changed its name to the Mid-West Crushed Stone Co.

George T. McMahon, near Agatha, Ida., will install machinery at his white marble quarry and will begin shipping at once.

Allegheny Quarry Co., Lancaster, Ohio, recently paid a 2 per cent dividend to its stockholders, it is reported, and the receivers have been discharged from their duties by the court.

Basalt Rock Co., Napa, Calif., has work in progress on a new plant near Napa, estimated to cost $150,000, including machinery. The initial unit is expected to be placed in service soon.

Cement

Clinchfield Portland Cement Corp., Kingsport, Tenn., has let the contract for electrification of its plant in Coreen, Ga.

Ohio Portland Cement Co., Germantown, Ohio, near Dayton, recently organized, is said to be arranging for the immediate construction of a new plant on local site, to consist of six buildings, three kilns, and auxiliary structures, including power house, estimated to cost more than $1,200,000 with equipment. Edward Ballard, West Baden, Ind., is one of the heads of the new company.

Lime

Blue Diamond Co., Dallas, Tex., has awarded a general contract to the Herbst Construction Co., Melba Bldg., for the erection of a 1-story plant for mortar and mortar color mixing and distribution. The machinery installation is estimated to cost about $23,000.

Soda and Potash Co., Loew State building, Los Angeles, Calif., C. W. Berry, president, has plans for the erection of a new plant on Sonora street, Burbank, near Los Angeles, 100x150 ft., with power house, estimated to cost $100,000, with equipment. The installation will include evaporators, filters, electric power apparatus, etc.

Personals

W. J. White, Jr., Sandusky, Ohio, was appointed general superintendent of the Sandusky Cement Co.'s plant at Bay Ridge. He succeeds Harvey N. Barrett, resigned.

E. H. Backemeyer has been appointed sales manager of the state owned South Dakota cement plant under construction at Rapid City. Mr. Backemeyer has been interested in the cement industry in Iowa, Minnesota, and South Dakota for about ten years. Operations in the plant will begin in October, according to present plans, and the first of the manufactured product will be ready for market in November.

C. F. Copp, until recently connected with the Cleveland works of the National Carbon Co., in charge of planning and execution of engineering work and special problems, has joined the home office sales force of the Sly Manufacturing Co., Cleveland, Ohio. Mr. Copp is a graduate engineer and has had a wide experience along mechanical lines. His practical knowledge of problems in connection with the installation and operation of a variety of equipment should be valuable to all concerned.

Obituary

Christ Depner, age 76, pioneer sand and gravel dealer of Spokane, Wash., died July 29 at his home at Spokane.

Trade Literature

Universal Vibrating Screen Co., Racine, Wis. Catalog 50 illustrating and describing in detail the Type C vibrating screen made by this company. Besides numerous halftones there are a number of diagrams, showing the method of setting up the screen, giving the plan, and the rear and side elevations. There is also a table showing screening tests with limestone, gravel and coal.

Webster Manufacturing Co., 4500 Cortland street, Chicago, Ill. General Catalog 48, containing 703 pages including an index. This book deals comprehensively with the Webster equipment for the mechanical handling of materials including standard types of elevating, conveying, and power transmitting machinery for a wide variety of industries handling material in bulk or package. Several pages are devoted to each type of equipment, and price lists and specification tables are included. No expense has been spared in the preparation of this catalog and it is worthy of a place in the library of all those who are interested in the equipment mentioned.